

24. EPA's 9 Key Elements for Watershed Restoration Plans - cont.

focusing on non-point source pollution and overall water quality.

- General water quality education for adults through the Master Stream Steward series of classes (modeled after the very successful Master Gardener training program)
- Annual state-of-the-watershed reports to publicize success stories, disseminated as a newspaper insert.
- Acknowledgement of project participants, if welcomed, through signage at project sites and stewardship awards.
- Presence at annual community festivals and events, such as Earthday and Farm-City Day.

Note: the above comprehensive education plan is currently on hold, due to lack of funding. This interruption is very unfortunate, as momentum for active participation will likely dissipate without continued efforts to keep the problems and solutions forefront in public awareness.

A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious.

An exact schedule for implementation is not realistic, as it is constrained by available funding, which is subject to the impacts of political appropriations. However, a goal of making steady progress suggests pursuing 2-3 large-scale projects (bank restoration, bioretention on commercial areas) every 2-3 years, and an ongoing concerted campaign for the installation of backyard practices to disconnect from downspouts. A conservative schedule suggests 10-20 backyard practices per year. As momentum is gained and backyard practices become more mainstream, it is possible that progress could become greatly accelerated, with up to 50 homeowners participating per year — but that is unlikely to happen until ten or more years down the road. Witness the evolution of behavior change related to recycling from the early 1970s when it first began being promoted, to the present, when many municipalities have curb-side pick-up and flourishing recycling programs. Education can create cultural change and accompanying behavior change, but it takes time -- several decades.

A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented.

Measurable milestones include number of practices implemented, both commercial and residential, number of acres of impervious area treated, gallons of stormwater prevented from running off, pounds of sediment captured and prevented from reaching streams, linear feet of eroding streambank stabilized or restored. A timetable of milestones is being developed from the Britton Creek Master Stormwater plan for the 9-element plan that is being developed. It will be complete before the start of this proposed grant.

A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made towards attaining water quality standards.

Criteria for stream health ultimately are those used to determine listing as a 303-d impaired stream: ability of the stream to meet its designated uses according to its use-classification. Mud Creek is a Class C stream, so aquatic habitat is the primary use for which it is evaluated. In the long term, evaluation criteria include presence of healthy biological communities as evidenced by the presence of fish and benthic macroinvertebrates in number and diversity determined by DWQ to indicate healthy

24. EPA's 9 Key Elements for Watershed Restoration Plans - cont.

aquatic communities. In the short term, assessment of the aquatic environment in terms of its ability to support healthy biological communities can be used to measure progress. Such assessment includes habitat assessment protocol used by DWQ, pebble counts as a measure of sedimentation, and Bank Erosion Hazard Index (BEHI) as a measure of likely sediment inputs. Improvements in results of these assessments following implementation of discrete projects can indicate progress toward ultimate improvement in overall stream quality. In addition, water chemistry parameters can also be used to assess the aquatic environment in terms of its ability to support healthy biological communities. Such parameters include pH, nitrates, phosphates, turbidity, total solids, dissolved oxygen, and various heavy metals.

A monitoring component to evaluate the effectiveness of the implementation efforts over time measured against the criteria established under item 8.

A comprehensive monitoring program should include:

- Regular monthly analysis of water chemistry parameters, carried out by the VWIN program, with collection of water samples by volunteers and analysis of the samples by a certified professional lab.
- Additional analysis of water chemistry parameters, carried out by the VWIN program, following storm events, to evaluate the impact of stormwater runoff on water quality.
- Measurement of sediment in stormwater runoff to evaluate the impact of runoff on water quality.
- Semi-annual (twice per year) sampling and analysis of benthic macroinvertebrate populations at key indicator sites across the watershed by trained volunteer monitors.
- Bi-annual (once every two years) sampling and analysis of benthic macroinvertebrate populations at key indicator sites across the watershed by professionals.
- Periodic (once every 5 years) sampling of fish populations at key indicator sites across the watershed by professionals.

In addition, assessment of the aquatic environment described in #8 (habitat assessment, pebble counts, BEHI), should be conducted preceding and following any discrete project implementation to measure short term effectiveness of such projects.

This is our vision for a comprehensive monitoring program. Implementation of a comprehensive monitoring program as described is dependent upon available funds. The Mud Creek Watershed Project relies on the 5-year basin-wide monitoring conducted by the NC Division of Water Quality for ultimate evaluation of progress on a five-year basis, as many of the above recommended monitoring components are not currently being done, due to lack of resources.

25. References and Literature Cited

French Broad River Basinwide Water Quality Plan, NC Division of Water Quality, April, 2011.
<http://portal.ncdenr.org/web/wq/ps/bpu/basin/>

Watershed Restoration Plan for the Mud Creek Watershed, Mud Creek Watershed Restoration Council, January 2003.
<http://www4.ncsu.edu/~dfsilve2/MudCreekWatershedReports/MudCreekRestorationPlan-2003.pdf>

Biological Impairment in the Mud Creek Watershed, NC Division of Water Quality. 2003. (The Division of Water Quality's technical report for the Watershed Assessment and Restoration Program (WARP) study). <http://h2o.enr.state.nc.us/swpu/>

Mud Creek Watershed Non-Point Source Pollution Inventory and Pollutant Load Estimates, Tennessee Valley Authority, 2001.
<http://www4.ncsu.edu/~dfsilve2/MudCreekWatershedReports/MudCreekIPSI-TVA-2001.pdf>

Britton Creek Stormwater Master Plan, McGill Associates, for the City of Hendersonville, August, 2011.
<http://www4.ncsu.edu/~dfsilve2/MudCreekWatershedReports/BrittainCrkStormwaterPlan-McGillAssoc-Aug2011.pdf>

Water Quality in the Mountains: Henderson County Volunteer Water Information Network, Year Fifteen Report. Marilyn J. Westphal, Steven C. Patch, Jillian D. Fishburn. UNC-Asheville Environmental Quality Institute, Technical Report No. 08 - 186, August 2008.
Also: Annual reports 1992 - 2007.

Jordan/Falls Lake Stormwater Nutrient Load Accounting Tool.
<http://portal.ncdenr.org/web/wq/ps/nps/fallslake>

Project I-2: Stormwater BMPs in the Town of Pittsboro and Robeson Creek Watershed

1. Project Title	Stormwater BMPs in the Town of Pittsboro and Robeson Creek Watershed
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2a. Grantee Primary Contact or Project Manager¹			
Name	Fred Royal		
Title	Town Engineer		
Organization Name	Town of Pittsboro		
E-mail address	froyal@pittsboronc.gov		
Mailing Address	PO Box 759		
City	Pittsboro	State	NC Zip 27312
Telephone	(919) 542-2063	Fax Number	(919) 542-2310

¹ A one-page Statement of Qualifications must be provided in Section 3 of the application form to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.

2b. Grantee Execution Address (where contract will be mailed for signature)			
Name	Bryan Gruesbeck		
Title	Town Manager		
Organization Name	Town of Pittsboro		
E-mail Address	bgruesbeck@pittsboronc.gov		
Mailing Address	PO Box 759		
City	Pittsboro	State	NC Zip 27312
Telephone	(919) 542-4621	Fax Number	(919) 542-7109
Federal Tax ID Number	56-6001311		

2c. Grantee Payment Address (where invoice payments will be mailed)			
Name	Mandy Cartrette		
Title	Finance Director		
Organization Name	Town of Pittsboro		
E-mail Address	ajcartrette@pittsboronc.gov		
Mailing Address	PO Box 759		
City	Pittsboro	State	NC Zip 27312
Telephone	(919) 542-4621	Fax Number	(919) 542-7109

3. Required Statement of Qualifications (to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.)

The following project team members have extensive experience with design, installation, maintenance, and monitoring of best management practices, including BMPs for construction site erosion and sediment control, urban stormwater control, agricultural and forestry runoff, and stream and wetland restoration:

Fred Royal, P.E., Town Engineer, Town of Pittsboro
Karen Hall, Ph.D., Extension Associate, Environmental Science
William F. Hunt, III, Ph.D., PE, Associate Professor and Extension Specialist
Ryan Winston, PE, Extension Associate, Water Resources Engineering
Dan Line, PE, Extension Specialist, Water Resources Engineering
Jean Spooner, PhD, Professor and Extension Specialist
Jamie Blackwell, Extension Assistant, Environmental Science

Current and Recent Past 319-Funded Projects (NCSU):

1. Robeson Creek Watershed Restoration 2007-2010
2. Town Lake Weed Control 2009-2012
3. Level Spreader- Vegetated Filter Strip Demonstration and Evaluation in Chatham County. 2010.
4. Revising the Tar-Pamlico BMP Selection Worksheets for Jordan Lake and Conducting Field Surveys to Assess Bioretention Design, Construction, and Maintenance. 2009.
5. Demonstration and Evaluation of Floating Wetland Islands. 2009.
6. Watershed Retrofit and Management Evaluation for Urban Stormwater Management Systems in North Carolina, Including Projected Costs and Benefits. 2008.
7. Demonstration & Monitoring of Rainwater Harvesting/ Cistern Technology in NC. 2008.
8. Putting LID on the 'Big Box': Integrating LID Technology on a Commercial Site. 2007.
9. Monitoring of Nutrient and Sediment Loading from Construction Sites. 2005-2007.
10. NPS Pollution Control Implementation for Water Quality. 2005.
11. Horse Manure and Pasture Management Education. 2003-2005.
12. Stormwater Wetlands in Asheville. 2004-2007.
13. Asheville Low Impact Development (LID) & Stormwater BMP Demonstrations. 2004-2007.
14. Designing BMPs to Comply with Phase II Stormwater Regulations. 2003-2005.
15. Bent Creek Stream Restoration and Stormwater Best Management Practices. 2003-2006.
16. Sediment Removal Demonstration and Evaluation for Mountain Streams. 2003-2004.
17. Robeson Creek Watershed Assessment and TMDL Implementation Plan. 2002-2006.
18. Demonstration of BMPs for Restoration of Coastal Plain Stream Systems. 2002-2005.
19. Restoration of Mountain Wetlands and Upper Yadkin Training Center. 2002-2005.
20. Minimizing Water Quality Impacts of Mountain Construction Projects. 2002-2004.
21. Comprehensive NPS Pollution Control Training Center. 2001-2004.
22. French Broad River Watershed Education Training Center. 2001-2004.
23. Watauga River Streambank and Riparian BMP Demonstration. 1998-2000.
24. South Fork Mitchell River Streambank and Pasture Management. 1998-2000.
25. Upper Neuse Urban Watersheds. 1997-2000.
26. Coastal Urban and Recreation BMP Demonstration Project. 1996-1999.
27. Long Creek National Monitoring Project. 1996-2001.

319(h) Grant Funds Requested	\$161,726
Match funds or in-kind Match Services	\$107,864
4. Total Project Cost	\$269,590

5. Project Start Date	January 1, 2014	Project End Date	December 31, 2016
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6. Project Location – REQUIREMENT: Important to submit as completely as possible, especially the Lat/Long coordinates and NC Impaired Waters List Assessment Unit Number. (NOTE: Payment of 319 Invoices will be held if all required information is not submitted in quarterly reports and the final reports, AU numbers, Lat/Long, and coordinates for all installed BMP practices)	
River Basin	Cape Fear
Watershed(s)	Robeson Creek
Watershed size	18240 acres
Impaired Waters Listed Stream	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Impaired Waters List Assessment Unit Number	16-38-(3)b
HUC(s) (12 digit USGS Hydrologic Unit Codes)	03030002060030
County	Chatham
USGS. 7.5 minute topographic quadrangle map(s) in project area	Pittsboro
Position coordinates of project location	Latitude 35°43'17" °N Longitude 79°10'50" °W

7. NPS Pollution Sources to be addressed (Check all that apply)			
	Agriculture		Waste Disposal (includes onsite systems)
	Construction	x	Hydrologic Modification
	Silviculture		Marina and Recreational Boating
x	Urban runoff/Stormwater		Groundwater Loading
	Resource Extraction	x	Natural Sources
x	Habitat Modification (drainage/filling wetlands, streambank destabilization)		Other:

8. NPS Pollutants to be addressed (check all that apply)			
x	Excess Nitrogen		Pesticides
x	Excess Phosphorus	x	Oil and grease
x	Sedimentation		Temperature
	Pathogens/Bacteria	x	pH
	Metals		Alterations
	Low dissolved oxygen		Other:

9. Estimate Load Reduction, if checked for excess nitrogen, excess phosphorus and/or sedimentation²	
# pounds of nitrogen saved from project implementation 11.77 lb/yr	Reference:
# pounds of phosphorus saved from project implementation 0.84 lb/yr	Reference:
# tons of soil saved from project implementation 0.33 ton/yr	Reference:
Load Reduction Model Used: STEPL, Region 5, L-THIA, Other Tar-Pamlico nutrient model	

² Providing a load reduction estimate is required for all BMP implementation projects, including demonstrations.

10. Do you intend for collected data to be used by DWQ for Use Support decisions?	
yes	Explanation: These are best management practices to capture and treat urban stormwater in an impaired watershed that is already being monitored by NC State University; data is available to DWQ.

11. Do you propose to install BMPs or other ag management measures that would be eligible for NC Agricultural Cost Share Program (ACSP) funding? If Yes, please document that the demand for ACSP funding in your county exceeds the supply, prompting your application for a 319(h) grant.

Yes

No X

12. Does this proposal address needs that were identified in a DWQ basin plan? If yes, please identify the specific need and the basin in which the need is outlined.

x

Explanation: Yes. Recommendations were to "protect streams in urbanizing areas".
Cape Fear River Subbasin 03-06-04
These BMPs will treat polluted water before it reaches tributaries of Robeson Creek.

13. Project Abstract (short concise summary of the project – DO NOT EXPAND SPACE PROVIDED)

The Robeson Creek Watershed is impaired for Total Phosphorus and Habitat Degradation. This project will implement stormwater BMPs recommended by both the 2003 TMDL implementation plan and the 2010 Robeson Creek Watershed Restoration Plan to help meet goals of reducing peak stormwater flows, Total Phosphorus (TP), Total Nitrogen (TN), total suspended solids (TSS), and improve and maintain aquatic habitat. Focus will be primarily on the Little Creek subwatershed with additional BMPs implemented in an unnamed tributary to Robeson Creek. A cluster of three bioretention areas will be installed in a parking lot in the center of downtown Pittsboro as well as an bioretention area behind the downtown buildings. A cistern will be placed at a downtown building adjacent to the cluster raingardens. Currently rooftop, parking lot, and street runoff from this heavily urbanized and impervious area flow directly to Little Creek, one of the most impaired Robeson Creek tributaries in the watershed. These BMPs will add to the ongoing pollution reduction efforts in this subwatershed that NCSU and the Robeson Creek Watershed Council have been implementing over the past 12 years. Additionally, two bioretention areas will be installed around Pittsboro Town Hall to capture and treat parking lot and roof runoff that currently flows to a Robeson Creek tributary.

As recommended in the restoration plan, the ongoing educational campaign of the Robeson Creek Watershed council will be continued with quarterly stakeholder meetings, tours, and informational signs at BMP locations.

14. Funding Requested										
Budget Categories (itemize all categories)	Section 319				Non-Federal Match *				Total	Justification (Include detailed explanation for each budget line item)
	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4		
Personnel/Salary	-	-	-	-	\$11,130	\$22,260	\$22,260	\$11,130	\$66,780	NCSU and Town of Pittsboro personnel salary match (Hunt, Royal, Home, Poteat 15%)
Fringe Benefits	-	-	-	-	\$4,014	\$8,028	\$8,028	\$4,014	\$24,084	NCSU and Town of Piittsboro personnel fringe match (30%)
Supplies	\$1000	\$2000	\$1000	\$500	-	-	-	-	\$4,500	Supplies include plants, educational signs,
Equipment	-	-	-	-	-	-	-	-	\$0	
Travel	-	-	-	-	\$200	\$300	\$300	\$200	\$1,000	Travel to project site, professional meetings to present project
Contractual	\$30,110	\$54,001	\$48,503	\$24,612	-	-	-	-	\$157,226	Design and implementation of BMPs with NCSU BAE
Other	-	-	-	-	\$2,667	\$5,333	\$5,333	\$2,667	\$16,000	Town of Pittsboro equipment usage for BMP installation match
Total Direct	\$31,110	\$56,001	\$49,503	\$25,112	\$18,011	\$35,921	\$35,921	\$18,011	\$269,590	
Indirect (max. 10% of direct costs, per 40 CFR 35.268)	-	-	-	-	-	-	-	-	-	
Annual Totals	\$31,110	\$56,001	\$49,503	\$25,112	\$18,011	\$35,921	\$35,921	\$18,011	\$269,590	
Grand Total	\$161,726				\$107,864				\$269,590	
% of Total Budget	60%				40%				100%	
*Note: Non-Federal match must be a minimum of 40% of the total project budget										

Year 1: January 1 - June 30, 2014 (6 months) – Total MUST equal sum of quarters 1-2 in Milestone Table #18

Year 2: July 1, 2014-June 30, 2015 (12 months) – Total MUST equal sum of quarters 3-6 in Milestone Table #18

Year 3: July 1, 2015-June 30, 2016 (12 months) – Total MUST equal sum of quarters 7-10 in Milestone Table #18

Year 4: July 1 - December 31, 2016 (6 months) – Total MUST equal sum of quarters 11-12 in Milestone Table #18

15. Budget Summary (Combined federal and match funds)							
	BMP Implementation	Project Management	Education Training or Outreach	Monitoring	Technical Assistance	Other	Total
Personnel	\$50,008	\$10,017	\$3,339	-	\$3,416	-	\$66,780
Fringe Benefits	\$18,063	\$3,613	\$1,204	-	\$1,204	-	\$24,084
Supplies	\$4,500	-	-	-	-	-	\$4,500
Equipment	-	-	-	-	-	-	-
Travel	\$750	\$150	\$100	-	-	-	\$1,000
Contractual	\$157,226	-	-	-	-	-	\$157,226
Operating Costs	-	-	-	-	-	-	-
Other	\$16,000	-	-	-	-	-	\$16,000
Total	\$246,547	\$13,780	\$4,643	-	\$4,620	-	\$269,590

16. Local and State Match (non-federal) Summary	
Total Match amount	\$107,864
Cash Match	\$0
In-kind Match	\$107,864
Source(s) of Cash Match	
Source(s) of In-kind Match	Salary Match (\$66,780) Fringe Match (\$24,084) Travel Match (\$1,000) Town equipment use (\$16,000)

17. Project Partners (may add more, if needed)³

Agency Name	NC Cooperative Extension Service-NCSU		
Agency Address	Campus Box 7637 Raleigh NC 27695		
Role/contribution to Project	Design and construction oversight with technical expertise from Karen Hall, Bill Hunt, Ryan Winston, Dan Line Jean Spooner, and Jamie Blackwell		
Contact Person	Karen Hall	Phone No.	919-515-8242
E-mail address	karen_hall@ncsu.edu		
Agency Name	NC Cooperative Extension Service-Chatham County		
Agency Address	45 South Street Pittsboro NC 27312		
Role/contribution to Project	County support in implementation and education,		
Contact Person	Sam Groce	Phone No.	919-542-8202
E-mail address	Sam_groce@ncsu.edu		
Agency Name	NRCS		
Agency Address	P.O. Box 309, Pittsboro 27312		
Role/contribution to Project	County support in implementation and education		
Contact Person	Mike Sturdivant	Mike Sturdivant	Mike Sturdivant
E-mail address	mike.sturdivant@nc.usda.gov		
Agency Name	Chatham County Soil and Water Conservation District		
Agency Address	P.O. Box 309, Pittsboro 27312		
Role/contribution to Project	County support in implementation and education		
Contact Person	Brenda Williams	Phone No.	919-542-8240
E-mail address	brenda.williams@ncmail.net		

³ A one-page Statement of Qualifications must be included in Section 3 of the application to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.

18. Project Milestone Schedule		
Time Period/Date	Activities (List specific quantifiable outputs or activities that will be achieved during each quarter)	Anticipated % of Requested Funding Spent¹
First Quarter Jan-Mar 2014	Begin planning and design of BMPs, hold stakeholder meeting; quarterly report	\$15,555 9.6% 9.6%
Second Quarter Apr-June 2014	Continue planning and design of BMPs, hold stakeholder meeting; quarterly report.	\$15,555 9.6% 19.2%
Third Quarter July-Sept 2014	Begin implementation of BMPs, hold stakeholder meeting; quarterly report	\$14,000 8.7% 27.9%
Fourth Quarter Oct-Dec 2014	Continue implementation of BMPs, install educational signs, hold stakeholder meeting; quarterly report.	\$14,000 8.7% 36.6%
Fifth Quarter Jan-Mar 2015	Continue implementation of BMPs, hold stakeholder meeting; quarterly report.	\$14,000 8.7% 45.3%
Sixth Quarter Apr-Jun 2015	Continue implementation of BMPs, hold stakeholder meeting; quarterly report.	\$14,001 8.7% 54.0%
Seventh Quarter July-Sept 2015	Continue implementation of BMPs, install educational signs, hold stakeholder meeting; quarterly report.	\$12,376 7.6% 61.6%
Eighth Quarter Oct-Dec 2015	Continue implementation of BMPs, hold stakeholder meeting; quarterly report.	\$12,376 7.6% 69.2%
Ninth Quarter Jan-Mar 2016	Continue implementation of BMPs, hold stakeholder meeting; hold workshop/tour, quarterly report.	\$12,376 7.6% 76.8%
Tenth Quarter Apr-June 2016	Continue implementation of BMPs, install educational signs, hold stakeholder meeting; quarterly report.	\$12,375 7.6% 84.4%
Eleventh Quarter ² July-Sept 2016	Complete implementation of BMPs, hold stakeholder meeting; quarterly report.	\$8,939 5.6% 90%
Twelfth Quarter Oct-Dec 2016	Hold stakeholder meeting; complete final report.	\$16,173 10.0% 100%

¹ Please show anticipated dollar amount, percent of grant spent that quarter, and cumulative percent of grant spent for project. Quarterly invoices will only be reimbursed up to percent indicated. Unused funds will carry forward to next quarter.

² 10% of grant will be held until receipt of Final Project Report

Note: Sum of funds spent in quarters 1-2 MUST equal year 1 total in Budget Table #14
Sum of funds spent in quarters 3-6 MUST equal year 2 total in Budget Table #14
Sum of funds spent in quarters 7-10 MUST equal year 3 total in Budget Table #14
Sum of funds spent in quarters 11-12 MUST equal year 4 total (min. 10% of 319 funds)

19. Background and goals of the project. Expand space, if necessary.

Background

The Robeson Creek watershed, located within the lower Haw River watershed (Cape Fear Subbasin 030604; HUC 03030002060030), lies within Chatham County and encompasses 28.6 square miles. The Robeson Creek watershed is both rural and urban and is located mostly within the Town of Pittsboro Planning District. Much of the land use is forest with pasture, cultivated crops and urban land, though the watershed is currently experiencing the beginnings of suburban housing development.

According to the Cape Fear River Basinwide Water Quality Plan (October 2005), the Robeson Creek watershed classified as water supply IV (WS-IV), Nutrient Sensitive Waters (NSW) and drains into the Haw River arm of Jordan Lake. Impaired ratings are listed for two bodies of water in the Haw River watershed: Robeson Creek and Pittsboro Lake. A TMDL for total phosphorus was developed for Robeson Creek in 2003 as a result of chlorophyll *a* violations in the Robeson Creek Cove of Jordan Lake. The TMDL calls for a 71 percent reduction from urban runoff as well as from the Pittsboro Waste Water Treatment Plant (WWTP). The NCSU Water Quality Group assisted NC DWQ by writing a TMDL Implementation Plan for Robeson Creek which was submitted in draft form to the EPA in 2003. Currently, a total of 3.3 miles of segments of Robeson Creek ([16-38-(3)a] and [16-38-(3)c]) remain on the 303(d) list for impairment of aquatic life (NC 303 (d) List, 2008 and draft 2010). Habitat degradation was cited in the basinwide plan as a result of urban runoff and nutrient enrichment from a poultry processing plant sprayfield. A TMDL for habitat degradation is pending. Segment [16-38-(5)] is part of the Robeson Creek Cove of Jordan Lake and is 303(d) listed for chlorophyll *a*.

In August 2009, the NC General Assembly enacted the Jordan Lake Nutrient Management Strategy to address a chlorophyll *a* impairment caused by high levels of nitrogen and phosphorus in the lake. One of the specific issues addressed by the rules includes reducing pollution from wastewater discharges, stormwater runoff, and agriculture and fertilizer application from new and existing development. The Robeson Creek watershed falls under the Haw River Arm of the Jordan Lake rules that requires an 8 percent reduction in nitrogen and a 5 percent reduction in phosphorus (Jordan Lake Nutrient Strategy, 2009).

Numerous water quality initiatives have taken place in the Robeson Creek Watershed since 2000. The Robeson Creek Watershed Council (RCWC), which includes members of federal, state, and local agencies as well as local businesses, landowners, and non-profit groups, meets quarterly to discuss issues in the watershed and ways to address them. The local Cooperative Extension office offers workshops on water quality topics in the watershed such as proper use of backyard fertilizer, streambank maintenance, and BMP installations such as raingardens in individual yards. The Chatham Soil and Water Conservation District is using some of its funding from the Community Assistance Programs to put in raingardens at local schools in the Robeson Creek Watershed. NCSU holds technical trainings for environmental professionals annually at BMP sites in Pittsboro. HRA actively monitors benthic macroinvertebrates in tributaries to Robeson Creek as well as holds annual stream cleanup events. The Haw River Assembly (HRA) was granted Section 319 funding for its Stream Steward Campaign in this watershed. HRA developed a stream stewardship guidebook for landowners, performed stream assessments within the watershed, surveyed local business and gave awards for good stream stewardship, and have hosted several workshops for landowner education regarding water quality. This watershed has active and dedicated stakeholders committed to improving water quality in their community.

The NCSU Water Quality Group obtained funding from the Clean Water Management Trust Fund (CWMTF) to perform a restoration feasibility study of Pittsboro Lake which is an impoundment of Robeson Creek. On-going water quality studies have indicated that Town Lake is impacted by urban and rural nonpoint source pollution. The lake experiences algal blooms stimulated by excessive nutrient input from the watershed. DWQ sampling in 1993 identified significant macrophyte infestation problems in the lake. The study, completed in 2007, suggested six restoration alternatives with the preferred alternative being a passive stream and wetland restoration approach. NCSU was awarded a CWMTF grant in 2009 to restore Town Lake using the preferred alternative approach as approved by the Pittsboro Board of Commissioners. The wetland restoration, completed in 2012, involved conversion of the lake to a more

natural ecosystem with a channel, associated wetland floodplain, and diverse native vegetative community. The wetland area also has a built-in storage component for water quality improvement purposes. NCSU is used 319 funds awarded in 2008 to address the invasive exotic vegetation infestation in the lake by employing seasonal control measures.

In 2009, NCSU was awarded a USDA National Integrated Water Quality Program grant to assist the Town of Pittsboro strengthen its stormwater ordinances, educate local youth on water quality issues in the watershed, and implement an educational raingarden for youth programs. The stormwater ordinance revisions will follow up on the riparian buffer and sub-division ordinance revisions completed in 2010 under the NCSU 2007 EPA Section 319 grant. The Town is a dedicated partner in helping facilitate water quality improvements at a policy level.

In 2010, NCSU is completed the Robeson Creek Watershed Restoration Plan based on the TMDL implementation plan, field studies, and EPA's 9-key elements for a watershed restoration plan. This plan lists BMPs installed throughout the watershed including cost, total nitrogen reduction, and total phosphorus reduction. The plan also recommends a series of nonpoint source management measures including the proposed BMPs included in this grant request.

In 2012, NCSU was awarded a Section 319 grant to implement stormwater BMPs along a tributary that flows to Little Creek. This work has commenced.

Project Objective

Through this proposed project, specific BMPs targeted at stormwater pollution will implemented at targeted locations to address nutrient impairments. Community involvement and education as well as technical guidance from the RCWC are paramount in removing this watershed from the 303(d) list, which is the ultimate objective.

The goals of this project are:

1. Implement three bioretention areas/raingardens in a parking lot adjacent to the courthouse circle (northwest quadrant) of Pittsboro within the Little Creek subwatershed to capture stormwater from the parking lot, adjacent road, and rooftops of two separate buildings in an effort to target nonpoint source TN, TP, TKN, and TSS loading, stormwater abatement, and habitat degradation.
2. Implement one bioretention area/raingarden in a parking lot behind downtown buildings of Pittsboro within the Little Creek subwatershed to capture stormwater from the parking lot, adjacent road, and rooftops of two separate buildings in an effort to target nonpoint source TN, TP, TKN, and TSS loading, stormwater abatement, and habitat degradation.
3. Implement two bioretention areas/raingardens beside two parking lots adjacent to the Town of Pittsboro Town Hall to capture stormwater from the parking lot and rooftop in an effort to target nonpoint source TN, TP, TKN, and TSS loading, stormwater abatement, and habitat degradation.
4. Install one cistern in the downtown area to capture stormwater from the rooftop in an effort to target nonpoint source TN, TP, TKN, and TSS loading, stormwater abatement, and habitat degradation.
5. Continue outreach and educational efforts regarding water quality through the Robeson Creek Watershed Council including a newsletter, a BMP tour, and educational signs.

20. A detailed description of the project. Expand space, if necessary.

The primary focus of this project will be on BMP installations to reduce total non-point phosphorus loading, address aquatic habitat degradation, and abate peak stormwater flows as recommended in the 2003 Robeson Creek TMDL Implementation Plan and the 2010 Robeson Creek Watershed Restoration Plan.

Downtown Pittsboro BMPs

The downtown area of Pittsboro, which drains to Little Creek, will be a main focus of nutrient removal. NCSU monitoring data has shown high levels of phosphorus in this creek. The Town of Pittsboro and additional landowners have been contacted and are willing to have BMPs installed. Further siting work is required and will include verification of property ownership and boundary lines, establishment of preliminary and final access and maintenance easements and Operations and Maintenance Agreements. The following is a list of proposed BMPs for this area:

Bioretentions/raingardens

A cluster of bioretention areas/raingardens will be installed between a parking lot and the existing sidewalk and buildings in the downtown area within the northwest area of the courthouse circle. This area currently has brick planter boxes, which would be removed and replaced. These BMPs will capture stormwater flow from the adjacent parking lot, roof runoff, and the parallel road. The BMP will filter pollutants prior to entry into stream channel. Re-vegetation will be included in the design.

A larger bioretention area/raingarden will be installed directly behind the downtown buildings to capture stormwater from multiple rooftops, multiple parking lots, and an adjacent road. The BMP will filter pollutants prior to entry into stream channel.

Cistern

A cistern will be added to the building on the aforementioned cluster BMP site. Reuse water will be used for landscaping and other purposes.

Downtown Pittsboro Town Hall BMPs

The building which is Pittsboro Town Hall drains to an unnamed tributary of Robeson Creek. The Town of Pittsboro plans to have the BMPs installed. The following is a list of proposed BMPs for this area:

Bioretentions/raingardens

A bioretention area/raingarden will be installed between a parking lot and Town Hall behind the building. These BMPs will capture stormwater flow from the adjacent parking lot and roof runoff. The BMP will filter pollutants prior to entry into stream channel. A small existing retention facility will be retrofitted to cause pollutant removal and remove standing water.

A bioretention area/raingarden will be installed between a parking lot and Town Hall in front of the building. These BMPs will capture stormwater flow from the adjacent parking lot and roof runoff. The BMP will filter pollutants prior to entry into stream channel. A small existing retention facility will be retrofitted to cause pollutant removal and remove standing water.

21. Monitoring/Environmental Data Collection. Describe in the section below how project data will be used (i.e. demonstrate effectiveness of BMPs installed, calculate load reductions, data to be used for State use support purposes, etc.). If monitoring is needed to document the water quality improvement from a project, a Quality Assurance Project Plan (QAPP) will be required (reviewed and approved by DWQ). For a QAPP template, visit the 319 Program website at <http://portal.ncdenr.org/web/wq/ps/nps/319program/applyfor319>

These sites will demonstrate effectiveness of the BMPs installed. Monitoring will not occur on these specific BMPs. However, NCSU is currently monitoring water quality upstream and downstream along Little Creek and any effects from these BMPs should be recorded up by current monitoring stations.

22. Public Involvement

Because this is a watershed restoration, public involvement is crucial to success. Cooperation with many individual landowners and businesses is necessary not only to implement BMPs throughout the watershed, but also to disseminate information about the importance of water quality.

The Robeson Creek Watershed Council meets quarterly and brings together stakeholders from all aspects of the community and watershed. Current events, project proposals, partnership opportunities and funding proposals are discussed during these meetings. These meetings are advertised to the public through newsletters and emails.

The Town of Pittsboro will take the lead role in this grant to demonstrate a public commitment to improving water quality and to providing further public education and involvement in the Robeson Creek Watershed. The Jordan Lake Existing Development Rules are under review and consideration and may require nutrient removal from existing development. This project, along with the others previously constructed, could be used as a means to achieve certain regulatory credits for nitrogen and phosphorous removal.

BMP installation is public involvement. Site tours of BMPs will be held to educate the public on the importance of BMPs to water quality. The Town website and local media coverage will highlight projects and encourage additional public involvement in water quality issues. Interpretive educational signs will be installed at each BMP.

23. List Project Outputs and Products (All 319 funded projects are required to submit Quarterly Progress Reports and a detailed Final Project Report, due by the end of the contract for DWQ review and approval.)

1. Implementation of three bioretention areas/raingardens adjacent to a parking lot in the northwest quadrant of the courthouse circle.
2. Implementation of one bioretention area/raingarden in a parking lot behind downtown businesses.
3. Implementation of two bioretention areas/raingardens adjacent to parking lot at Town Hall
4. One cistern placed on a downtown building adjacent to the parking lot in the courthouse circle area
5. One BMP tour
6. Educational signs at BMPs
7. Quarterly stakeholder meetings
8. Quarterly reports
9. Final report

24. Projects Developing or Implementing a Watershed Restoration Plan must include EPA's 9 Key Elements for Watershed Restoration Plans. Draft Plans must be submitted to DWQ for review and approval at least *60 days before* end of the project/contract period (use additional pages if necessary).

- | | |
|---|---|
| 1 | An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed |
| 2 | A description of the NPS management measures that will need to be implemented to achieve load reductions as well as to achieve other watershed goals identified in the watershed based plan |
| 3 | An estimate of the load reductions expected for the management measures |
| 4 | An estimate of the amount of technical and financial assistance needed associated costs and or sources and authorities that will be relied upon, to implement the plan |
| 5 | An information/education component that will be used to enhance public understanding of the project |
| 6 | A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious |
| 7 | A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented |
| 8 | A set of criteria that can be used to determine whether loading reductions are being achieved overtime and substantial progress is being made towards attaining water quality standards |
| 9 | A monitoring component to evaluate the effectiveness of the implementation efforts over time measured against the criteria established under item 8. |

A watershed plan has already been developed for the Robeson Creek watershed.

25. References and Literature Cited

NCDENR DWQ, April 2005.

Draft Jordan Lake Nutrient Management Strategy.

NCDENR DWQ Water Quality Section, Total Maximum Daily Load (TMDL) for Total Phosphorus for Roberson Creek Subbasin 03-06-4 Cape Fear River Basin, North Carolina, Final Report August 2003, approved by EPA January 2004.

Robeson Creek TMDL Implementation Plan-Draft Version. August 4, 2003. NC Division of Water Quality, Raleigh NC.

U.S. Environmental Protection Agency (USEPA). 2008. Handbook for Developing Watershed Plans to Restore and Protect Our Waters. Office of Water, Nonpoint Source Control Branch, Washington DC 20460. EPA 841B08002.

Project I-3: Engaging Youth in Improving Burnt Mill Creek through High Priority Storm Water Retrofits

1. Project Title	Engaging youth in improving Burnt Mill Creek through high priority storm water retrofits
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2a. Grantee Primary Contact or Project Manager	
Name	Christy Perrin
Title	Program Manager
Organization Name	NC State University
E-mail address	Christy_perrin@ncsu.edu
Mailing Address	Campus Box 8109, 4326 Nelson Hall
City	Raleigh State NC Zip 27695
Telephone	919-515-4542 Fax Number 919-515-1824

¹ A one-page Statement of Qualifications must be provided in Section 3 of the application form to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.

2b. Grantee Execution Address (where contract will be mailed for signature)	
Name Title	Matt Ronning
Organization Name	Associate Vice Chancellor
E-mail Address	North Carolina State University
Mailing Address City	sps@ncsu.edu
Telephone	2701 Sullivan Drive, Administrative Services III, CB 7514
Federal Tax ID Number	Raleigh State NC Zip 27695-7514 919-515-2444 Fax Number 919-515-7721 56-6000-756

2c. Grantee Payment Address (where invoice payments will be mailed)	
Name Title	Julie Brasfield
Organization Name	Director, Office of Contracts and Grants
E-mail Address	NC State University
Mailing Address	julie_brasfield@ncsu.edu
City	2701 Sullivan Drive, Administrative Services III, Box 7214
Telephone	Raleigh State NC Zip 27695-7214 919-515-2153 Fax Number 919-515-469 3

3. Required Statement of Qualifications (to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.)

1. Perrin, Christy, MPA. Program Manager and Extension Associate.

REDACTED

Exemption 6 Personal Privacy

2. William F. Hunt, III, Ph.D., PE,

Exemption 6 Personal Privacy

Ryan Winston, M.S., BAE Department, NCSU,

Staff from several city of Wilmington departments have experience working on 319 grant projects within the city. The Stormwater Services Division has two professional engineers (P.E) on staff, Dave Mayes and Robert Williams, who have been involved with design and implementation of 319 grant projects in the past. Layton Lomax, the Drainage Manager for Stormwater Services will provide oversight of stormwater best management practices (BMP) installations. Layton has been involved with the current 319 street retrofit grant installations in collaboration with NCSU. Two stormwater field crews, the BMP Crew and the Closed Drainage Crew, have been responsible for the installation and maintenance of stormwater Best management Practices throughout the city. Currently, the BMP Crew maintains 50+ stormwater BMPs including wetlands, ponds and bioretention areas. This crew has also been involved in the installation of bioretention areas, retention ponds, wetlands, and street retrofit elements in conjunction with several 319 grant projects. Two BMP Crew members hold current certifications in NC BMP Inspection and Maintenance Certification. The Closed Drainage Crew also has experience installing stormwater BMPs in connection with 319 grant projects including bioretention areas, pervious pavement, and silva cells. In addition, both crews have training in Trenching and Shoring, OSHA, Illicit Discharge identification, and Muddy Waters training. The Streets Division of the City, led by Jay Carter, has been involved in the installation of pervious pavement, bioretention areas, silva cells in connection with the current 319 grant project as well.

319(h) Grant Funds Requested	\$198,938
Match funds or in-kind Match Services	\$133,240
4. Total Project Cost	\$332,178

5. Project Start Date	1/1/2014	Project End Date	6/30/2016
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6. Project Location – REQUIREMENT: Important to submit as completely as possible, especially the Lat/Long coordinates and NC Impaired Waters List Assessment Unit Number.
(NOTE: Payment of 319 Invoices will be held if all required information is not submitted in quarterly reports and the final reports, AU numbers, Lat/Long, and coordinates for all installed BMP practices)

River Basin	Cape Fear
Watershed(s)	Burnt Mill Creek
Watershed size	4,274 acres
Impaired Waters Listed Stream	Yes <input checked="" type="checkbox"/> (both) No <input type="checkbox"/>
Impaired Waters List Assessment Unit Number	18-74-63-2
HUC(s) (12 digit USGS Hydrologic Unit Codes)	03030007140010
County	New Hanover
USGS. 7.5 minute topographic quadrangle map(s) in project area	Wilmington
Position coordinates of project location	latitude 34° 15' 17" N; longitude 77° 55' 17" W

7. NPS Pollution Sources to be addressed (Check all that apply)

<input type="checkbox"/>	Agriculture	<input type="checkbox"/>	Waste Disposal (includes onsite systems)
<input type="checkbox"/>	Construction	<input type="checkbox"/>	Hydrologic Modification
<input type="checkbox"/>	Silviculture	<input type="checkbox"/>	Marina and Recreational Boating
<input checked="" type="checkbox"/>	Urban runoff/Stormwater	<input type="checkbox"/>	Groundwater Loading
<input type="checkbox"/>	Resource Extraction	<input type="checkbox"/>	Natural Sources
<input type="checkbox"/>	Habitat Modification (drainage/filling wetlands, streambank destabilization)	<input type="checkbox"/>	Other:

8. NPS Pollutants to be addressed (check all that apply)

<input checked="" type="checkbox"/>	Excess Nitrogen	<input type="checkbox"/>	Pesticides
<input checked="" type="checkbox"/>	Excess Phosphorus	<input checked="" type="checkbox"/>	Oil and grease
<input checked="" type="checkbox"/>	Sedimentation	<input type="checkbox"/>	Temperature
<input checked="" type="checkbox"/>	Pathogens/Bacteria	<input type="checkbox"/>	pH
<input checked="" type="checkbox"/>	Metals	<input type="checkbox"/>	Alterations
<input type="checkbox"/>	Low dissolved oxygen	<input type="checkbox"/>	Other:

9. Estimate Load Reduction, if checked for excess nitrogen, excess phosphorus and/or sedimentation²	
# pounds of nitrogen saved from project implementation 10.11 lb/yr	Reference: Coastal Plain Tar-Pamlico model, NCDENR stormwater BMP manual. Also, based on an average of 100 mg/L influent concentration off of commercial parking lot.
# pounds of phosphorus saved from project implementation 0.75 lb/yr	Reference: Coastal Plain Tar-Pamlico model, NCDENR stormwater BMP manual.
# tons of soil saved from project implementation 0.28 tons TSS/yr	Reference: Coastal Plain Tar-Pamlico model, NCDENR stormwater BMP manual.
Load Reduction Model Used: STEPL, Region 5, L-THIA, Other Tar-Pamlico Model (Coastal Plain)	

² Providing a load reduction estimate is required for all BMP implementation projects, including demonstrations.

10. Do you intend for collected data to be used by DWQ for Use Support decisions?	
no	Explanation:

11. Do you propose to install BMPs or other ag management measures that would be eligible for NC Agricultural Cost Share Program (ACSP) funding? If Yes, please document that the demand for ACSP funding in your county exceeds the supply, prompting your application for a 319(h) grant.	
Yes	No X

12. Does this proposal address needs that were identified in a DWQ basin plan? If yes, please identify the specific need and the basin in which the need is outlined.	
yes	<p>Explanation: From <i>Cape Fear River Basin Plan (2005): Current Status</i> Burnt Mill Creek from source to Smith Creek (4.6 miles) is impaired for aquatic life because of a poor benthic community rating at site BB73. A Collaborative Assessment of Watersheds and Streams (CAWS) in 2003 indicated that the benthic community in Burnt Mill Creek was primarily impacted by toxicity and sedimentation, with lack of instream habitat and nutrient enrichment as chronic stressors to the benthic community. A Local Watershed Plan (Chapter 34) was developed by NCEEP in 2002 that identified similar habitat problems in the watershed. The plan also outlines restoration strategies and locations for BMPs.</p> <p>2005 Recommendations: DWQ will continue to monitor the Burnt Mill Creek watershed. DWQ will work with NCEEP and the watershed stakeholders, including the City of Wilmington, to assist where possible in implementation of the restoration strategy.</p>

13. Project Abstract (short concise summary of the project – DO NOT EXPAND SPACE PROVIDED)

NC State University and the City of Wilmington have been successfully partnering with New Hanover Schools and others in the Burnt Mill Creek Watershed to identify and implement stormwater retrofit projects throughout the watershed, measure their effectiveness, and increase knowledge and awareness of citizens in the watershed. The team has installed over two dozen BMP retrofits so far and seeks to build on this momentum to install high priority parking lot retrofits that will provide stormwater runoff amelioration and treatment where none is present today, while engaging youth and educators in hands-on learning about watershed restoration. Burnt Mill Creek is impaired for aquatic life and secondary recreation and was placed on the state's 303(d) list because of impacts from urban stormwater runoff, including toxic impacts from pollutants. In 2002, the NC Ecosystem Enhancement Program (NCEEP) completed a watershed plan for the creek. NCDWQ's Assessment Report of the Burnt Mill Creek Watershed (2004) identified toxic impacts from PAHs as the primary cause of biological impairment, with secondary and cumulative causes identified as sedimentation and nutrient enrichment.

Recent research has revealed that commercial/industrial land uses, in particular parking lots, are likely the highest contributors of PAHs in runoff to urban streams. Research by NCSU on the watershed's one parking lot bioretention cell retrofit revealed a 76-91% reduction in PAHs. Similar reductions are expected at new parking lot retrofit sites proposed herein. Most recently, the team studied runoff reductions of street retrofits, and learned that while they reduced runoff volumes and concentrations and loads of all detectable pollutants, PAHs in the street runoff were negligible. This illustrates that parking lots are a higher priority for stormwater treatment than streets if the goal is to reduce PAHs in the creek. This proposal leverages high priority parking lot stormwater retrofits at New Hanover High School and DREAMS of Wilmington (an after school arts center for at-risk and underserved youth) to engage students and teachers in hands-on learning about watershed improvement. The project will also better quantify pollutant reductions possible from parking lot retrofits so that future parking lot retrofits can be designed to maximize pollutant removal.

14. Funding Requested

Budget Categories (itemize all categories)	Section 319				Non-Federal Match *				Total	Justification (Include detailed explanation for each budget line item)
	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4		
Personnel/Salary	17,067	30,585	28,850		3,029	6,058	6,058		91,647	Perrin(.25FTE)to coordinate, conduct outreach; Winston (.20FTE) to design BMPs & oversee construction; BAE staff (.16FTE) to conduct monitoring; Cost share; Hunt (.05FTE) BMP oversight;
Fringe Benefits	5,120	9,175	8,656		909	1,817	1,817		27,494	At 30% for NCSU staff
Supplies	9,000	12,000	6,000		0	12,000	0		39,000	For BMPs, Monitoring equipment for BMPs educational materials; cost share: paver donation from Belgard
Equipment	0	0	0		0	0	0		0	
Travel	3,000	3,000	3,000		0	0	0		9,000	Travel to/from Wilmington
Contractual	4,860	37,860	2,180		8,700		0		44,900	Construction of the NHHS retrofits, installation of permeable pavers; Wilmington monitoring contract with UNC-W
Other	500	0	0		26,128	26,128	0		52,756	Communications- mailing and long distance calls; Wilmington match, time and equipment, to construct BMPs; DREAMS staff to conduct youth education.
Total Direct	39,547	92,620	48,686		30,066	46,003	7,875		264,797	

Indirect (max. 10% of direct costs) Other- unrecovered indirect 23.6%% on fed direct, 33.6% on NCSU match	3,955	9,262	4,869		10,656	24,504	14,136		18,086	Facilities & administrations cost Unrecovered F&A that is absorbed by NCSU; cost share F&A normally charged on NCSU match
									49,296	
Annual Totals	43,502	101,882	53,554		40,722	70,507	22,011		332,178	
Grand Total	198,938				133,240					
% of Total Budget	59.89%				41.11%				100%	

*Note: Non-Federal match must be a minimum of 40% of the total project budget

Year 1: January 1 - June 30, 2014 (6 months) – Total MUST equal sum of quarters 1-2 in Milestone Table #18

Year 2: July 1, 2014-June 30, 2015 (12 months) – Total MUST equal sum of quarters 3-6 in Milestone Table #18

Year 3: July 1, 2015-June 30, 2016 (12 months) – Total MUST equal sum of quarters 7-10 in Milestone Table #18

Year 4: July 1 - December 31, 2016 (6 months) – Total MUST equal sum of quarters 11-12 in Milestone Table #18

15. Budget Summary (Combined federal and match funds)

	BMP Implementation	Project Management	Education Training or Outreach	Monitoring	Technical Assistance	Other	Total
Personnel	44,944	3,595	49,184	12,802	15,145		125,670
Fringe Benefits	10,484	1,078	7,548	3,841	4,543		27,494
Supplies	30,900	-	9,633				40,533
Equipment	8,000						8,000
Travel	3,600		3,600	1,800			9,000
Contractual	32,000		-	21,600			53,600
Operating Costs	13,476	13,476	13,476	13,476	13,477		67,381
Other			500				500
Total	143,404	18,149	83,941	53,519	33,165		332,178

16. Local and State Match (non-federal) Summary

Total Match amount	\$133,240
Cash Match	\$31,688
In-kind Match	\$101,552
Source(s) of Cash Match	Salary and benefits for Bill Hunt to oversee BMP construction and monitoring Pavers from Belgard provided at greatly reduced cost.
Source(s) of In-kind Match	City of Wilmington staff time for asphalt and curb demolition and removal, BMP installation at DREAMS, and coordinating city's efforts, equipment use from City of Wilmington, Burnt Mill Creek monitoring contract with UNC-W. DREAMS staff time and supplies. Under-recovered F&A on request. F&A on NCSU match.

17. Project Partners (may add more, if needed)³

Agency Name	City of Wilmington Stormwater Services		
Agency Address	P.O. Box 1810, Wilmington, NC 28402		
Role/contribution to Project	Coordinate City's efforts, assist in all aspects of project including construction, provide education and outreach		
Contact Person	David Mayes, Jennifer Butler	Phone No.	910-341-5880
E-mail address	dave.mayes@wilmingtonnc.gov, Jennifer.butler@wilmingtonnc.gov		
Agency Name	NCSU Dept. of Biological and Agricultural Engineering		
Agency Address	Weaver Labs, Raleigh, NC 27695		
Role/contribution to Project	Complete designs and oversee construction of street retrofits, conduct monitoring of retrofits		
Contact Person	Bill Hunt, Ryan Winston	Phone No.	919-515-6751
E-mail address	Bill_hunt@ncsu.edu; rjwinsto@ncsu.edu		
Agency Name	City of Wilmington, Dept. Public Services		
Agency Address	265 Operation Center Drive, PO Box 1810, Wilmington, NC 28402-1810		
Role/contribution to Project	Provide asphalt removal		
Contact Person	Jay Carter	Phone No.	910-341-7899
E-mail address	Jay.Carter@wilmingtonnc.gov		
Agency Name	DREAMS		
Agency Address	P.O. Box 363, Wilmington NC 28402		
Role/contribution to Project	Conduct youth education activities, help design signs, coordinate with team on design and installation of BMP retrofits at DREAMS		
Contact Person	Emily Colin, Associate Director	Phone No.	(910) 772-1501
E-mail address	dreamsprogramms@ec.rr.com		
Agency Name	New Hanover High School		
Agency Address	1307 Market Street, Wilmington, NC 28401		
Role/contribution to Project	Coordinate with administrators, teachers		
Contact Person	Mr. Jackie Blackmore, Assoc Principal. Phone: 910-251-6100		
E-mail address	noal.blackmore@nhcs.net		

³ A one-page Statement of Qualifications must be included in Section 3 of the application to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.

18. Project Milestone Schedule

Time Period/Date	Activities (List specific quantifiable outputs or activities that will be achieved during each quarter)	Anticipated % of Requested Funding Spent ¹
First Quarter Jan-Mar 2014	Engage DREAMS staff, youth, and neighbors in visioning for the retrofit design (workshop/charette). Finish and submit QAPP. Set up equipment to begin monitoring existing conditions NHHS site.	\$ 21,684 (10.9%)
Second Quarter Apr-June 2014	Engage DREAMS staff, youth, and neighbors in visioning for the retrofit design (workshop/charette). Share NHHS draft site design with teachers and administrators and acquire feedback. Revise NHHS engineered design based on feedback. Submit NHHS request for bids for construction, review and select contractor.	\$ 21,684 (10.9%) 21.8% of total
Third Quarter July-Sept 2014	Create a concept design for DREAMS site to include a treatment train of stormwater management retrofits, integrated art, seating, and other elements determined by the visioning sessions. DREAMS architect to develop sketch drawing of the plan, for public viewing and feedback. Complete calibration period monitoring at NHHS. Construct NHHS retrofits with private contractor during summer vacation.	\$ 32,029(16.1%) 37.9% of total
Fourth Quarter Oct-Dec 2014	Engage students and DREAMS staff in reviewing concept designs and revising as needed. Develop engineering plan. Coordinate creation of aesthetic elements (seating, signage, art, etc) with DREAMS teachers and classes. Begin treatment period monitoring at NHHS. Engage science classes at the high school to teach them about data acquisition and analysis.	\$21,883(11%) 48.9% of total
Fifth Quarter Jan-Mar 2015	Coordinate with City of Wilmington Stormwater Services to finalize engineering plan for DREAMS site. Plan and coordinate construction with City of Wilmington and DREAMS. Coordinate creation of aesthetic elements with DREAMS teachers and classes. Continue treatment period monitoring at NHHS.	\$19,894(10%) 58.9% of total
Sixth Quarter Apr-Jun 2015	Coordinate creation of aesthetic elements (seating, signage, art, etc) with DREAMS teachers and classes. Continue treatment period monitoring at NHHS.	\$27,851(14%)72.9% of total
Seventh Quarter July-Sept 2015	Hold planting event with students after school starts. Continue treatment period monitoring at NHHS.	\$ 21,883(11%) 83.9% of total
Eighth Quarter Oct-Dec 2015	Excavate and construct the DREAMS retrofits. Engage students and DREAMS staff in planting bioretention area(s). Create educational signs for sites. Complete treatment period monitoring at NHHS site.	\$8156(4.1%) 88% of total
Ninth Quarter Jan-Mar 2016	Conduct a public celebratory event (s) upon completion of the retrofits, engage media. Begin writing final report on monitoring results. Analyze data	\$3,979(2%) 90% of total

Tenth Quarter Apr-June 2016	Engage students/DREAMS staff in a maintenance event to ensure long-term upkeep, add plants that were unavailable in late fall. Complete final report for monitoring. Begin production of peer-reviewer journal article.	\$19,894 (10%) 100% of total
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¹ Please show anticipated dollar amount, percent of grant spent that quarter, and cumulative percent of grant spent for project. Quarterly invoices will only be reimbursed up to percent indicated. Unused funds will carry forward to next quarter.

² 10% of grant will be held until receipt of Final Project Report

Note: Sum of funds spent in quarters 1-2 MUST equal year 1 total in Budget Table #14

Sum of funds spent in quarters 3-6 MUST equal year 2 total in Budget Table #14

Sum of funds spent in quarters 7-10 MUST equal year 3 total in Budget Table #14

Sum of funds spent in quarters 11-12 MUST equal year 4 total (min. 10% of 319 funds)

19. Background and goals of the project. Expand space, if necessary.

Burnt Mill Creek is listed as impaired for aquatic life and secondary recreation on the state's 303(d) list from impacts of urban stormwater runoff, including toxic impacts from polycyclic aromatic hydrocarbons (PAHs). In 2002, the NC Ecosystem Enhancement Program (NCEEP) completed a watershed plan for the creek. NCDWQ's Assessment Report of the Burnt Mill Creek Watershed (2004) identified toxic impacts from PAHs as the primary cause of biological impairment, with secondary and cumulative causes identified as sedimentation and nutrient enrichment. With the aid of USGS, NCSU recently discovered that the extremely high levels of PAHs in Burnt Mill Creek reported by a subcontractor in a 2008 report were over-reported, indicating that the levels of PAHs in Burnt Mill Creek, while still high enough to cause environmental effects, are not insurmountable. This gives more hope to the possibilities of Burnt Mill Creek's water quality improving through restoration and redevelopment activities. Stakeholders led by NC State University and the City of Wilmington have been working together to implement watershed improvement projects to improve its health through the following recommendations in the NCDWQ Report:

Feasible and cost-effective stormwater retrofit projects should be implemented throughout the watershed to mitigate the hydrologic effects of development.

A strategy to address toxic inputs should be developed and implemented, including a variety of source reduction and stormwater treatment methods.

Watershed Education for Communities and Officials (WECO) and the Dept. of Biological and Agricultural Engineering at NC State University (NCSU), have partnered with the City of Wilmington, Cape Fear River Watch, New Hanover County Schools, and others to identify and implement stormwater retrofit projects throughout the watershed over the past decade. Additionally, the effectiveness of these retrofit projects at reducing runoff and PAHs has been quantitatively measured. Through community meetings and outreach, the watershed's residents have an increased knowledge and awareness of urban stormwater in the watershed. The team has installed several BMP retrofits so far, including 2 large stormwater wetlands, parking lot bioretention at Port City Java, permeable pavement and bioretention at the YMCA, bioretention and cisterns at two schools, and 14 residential raingardens and 36 rainbarrels in the Bottom Neighborhood (a low income, floodprone neighborhood in the watershed). Most recently the team installed street retrofits that employ a mix of bioretention cells, permeable pavement, and tree filter boxes. Monitoring showed these retrofits to successfully reduce all pollutants in the runoff and reduced stormwater runoff volumes by 52% over the year-long monitoring period.

A literature search on PAHs by the PI (2012) found that commercial/industrial land uses, in particular parking lots, are likely the highest contributors of PAHs in urban runoff to streams. Research by NCSU on the watershed's parking lot bioretention retrofit revealed a 76-91% reduction in PAHs leaving the bioretention. Similar reductions are expected at new parking lot retrofit sites proposed here. As a result of the team's most recent research studying runoff reductions of street retrofits, they learned that PAHs in street runoff was negligible, illustrating that parking lots are a higher priority for stormwater treatment than streets if the goal is to reduce PAHs in the creek.

The ultimate goals for Burnt Mill Creek are to remove it from the 303(d) list, and increase the safety for human and animal secondary contact with the creek. To achieve this will require the cumulative impact of many retrofit projects and redevelopment projects incorporating stormwater management. The work is happening, with each retrofit project and redevelopment cumulatively reducing the stormwater runoff and pollutants from 2004 levels.

Specifically, this proposal seeks to construct two high priority parking lot retrofits that will provide stormwater runoff amelioration and treatment where none is occurring today, while engaging youth and

educators in hands-on learning about watershed restoration through storm water management.

Goals of the project are to:

- 1) Implement high priority parking lot stormwater retrofits at New Hanover High School and DREAMS of Wilmington (an after school arts center for at-risk and underserved youth) that will reduce stormwater runoff and associated pollutants (including PAHs) to Burnt Mill Creek.
- 2) To leverage retrofit design and construction as a means to educate youth and adults about watershed protection and stormwater management through their involvement in helping design, construct, and maintain the stormwater retrofits at two educational facilities in the watershed.
- 3) To better quantify pollutant reductions possible from parking lot retrofits so future parking lot retrofits can be designed to maximize pollutant reductions.

20. A detailed description of the project. Expand space, if necessary.

The project consists of 3 major components, including a multiple bioretention retrofit at the New Hanover High School parking lot, a multi-BMP retrofit at DREAMS, and runoff monitoring.

1) New Hanover High School retrofit:

The project team used a previous NC CWMTF grant to identify this retrofit site and work with New Hanover High School administration, and New Hanover Public Schools Facilities administration to develop a draft design. The following tasks are proposed to complete the retrofit:

- Gather feedback on existing engineering designs: Currently the team has draft designs for the New Hanover High School (NHHS) parking lot retrofit project, at 70% completion. We will work with teachers, students, and administrators at NHHS to review the drafts, soliciting feedback to produce designs that provide the most water quality improvement, the easiest maintenance, and the best educational benefit. As an example, the retrofit designs may be tweaked to provide opportunities for outdoor science laboratory activities, such as enabling the school to conduct pre- and post construction water quality experiments and continuing experiments after construction.
- Finalize designs: Feedback from teachers and administrators will be incorporated into a final, construction-ready design.
- Create RFP for construction bids, hold bid meeting for applicants, review and select a contractor
- Install bioretention: NC State field faculty will work with the contractor to install three bioretention cells with a total surface area of 2300 ft².
- Plant bioretention: Students and teachers will be engaged in planting and mulching the bioretention areas. The event will include education about the Burnt Mill Creek watershed.
- Maintenance training: Teachers and student clubs will be provided with a maintenance guide for the bioretention cells.
- Incorporate retrofit project into NHHS educational programming: The project team will work with NHHS teachers to help them design activities to incorporate the project and results into classroom and/or club activities. Topics will focus on water quality improvement, stormwater and watershed management.

- Create and install educational signs for the site in cooperation with teachers and administrators

2) DREAMS retrofits

DREAMS is a non-profit that is located on City of Wilmington property within the Burnt Mill Creek watershed. Their mission: "DREAMS of Wilmington is dedicated to building creative, committed citizens, one child at a time, by providing youth in need with high-quality, free-of-charge programming in the literary, visual and performing arts". The City of Wilmington will provide construction and future maintenance services for the BMPs installed at this site. The following tasks are proposed for the retrofits at this site:

- Engage DREAMS staff, youth, and neighbors in visioning for how the retrofit design may meet multiple goals of stormwater runoff and pollution reduction, improved community health, increased understanding of watershed science, and improved site aesthetics. This may involve a community workshop and/or design charrettes conducted with students. Workshops and charrettes will involve education about watershed science.
- The DREAMS architect will develop sketch(es) of the plan for public viewing and feedback (we've found that an artfully drawn design can spark better involvement than engineering plan sheets).
- Create a concept design for the site to include a treatment train of stormwater management retrofits including bioretention, permeable pavement and rainwater harvesting; integrated art, seating, and other elements determined by the visioning sessions.
- Engage students and DREAMS staff in reviewing concept designs and revising as needed.
- NCSU engineer develops engineering plans.
- Coordinate with City of Wilmington Stormwater Services to finalize engineering plans.
- Plan and coordinate construction with City of Wilmington and DREAMS.
- Coordinate creation of aesthetic elements (seating, signage, art, etc) with DREAMS teachers and classes.
- Create educational signs for site.
- Excavate and construct the retrofits (City of Wilmington, overseen by NCSU).
- Engage students and DREAMS staff in planting bioretention area(s).
- Conduct a public celebratory event upon completion of the retrofits, engage media.
- Engage students/DREAMS staff in aesthetic maintenance to supplement City of Wilmington maintenance

3. Monitoring Runoff

Since Burnt Mill Creek is 303(d) listed primarily for PAHs, analysis of the improvements in PAH concentration resulting from bioretention design is warranted for this project. Because analysis of PAHs in stormwater is expensive, there is a lack of data in the literature. We propose monitoring 10 storm events at control and retrofitted sites to determine the improvements in PAH concentrations from the BMPs. Monitoring would involve flow-proportional sampling at both sites. A thorough statistical analysis of these data will be performed. Results will help inform future retrofit project designs in this watershed.

21. Monitoring/Environmental Data Collection. Describe in the section below how project data will be used (i.e. demonstrate effectiveness of BMPs installed, calculate load reductions, data to be used for State use support purposes, etc.). If monitoring is needed to document the water quality improvement from a project, a Quality Assurance Project Plan (QAPP) will be required (reviewed and approved by DWQ). For a QAPP template, visit the 319 Program website at <http://portal.ncdenr.org/web/wq/ps/nps/319program/applyfor319>

Stormwater monitoring will be undertaken at the New Hanover High School (NHHS) parking lot to determine the improvements that parking lot bioretention swales (bioswales) can provide. These practices have the potential for application across North Carolina, and will provide data on catchment-scale implementation. The three proposed bioswales (see finalized CAD drawings) are located in the treatment watershed, which drains to a single catch basin. The southern portion of the parking lot will drain, untreated, to a second catch basin. Monitoring will occur at two locations: (1) the outlet of the untreated catchment, which will serve as a control and (2) the outlet of the retrofitted parking lot catchment. Two monitoring periods will be utilized: a six-month calibration period (pre-retrofit) and a one-year treatment period (post-retrofit). This will produce a total of four data sets using a paired watershed experimental design.

Weir boxes with sharp-crested v-notch weirs and stage recorders will be used to determine flow volumes and peak flow rates from the control and retrofitted catchments. An ISCO 6712 automated sampler will collect flow-proportional water quality samples at both the control and retrofitted catchments. These samples will be preserved (as needed) and delivered to a lab on NC State University campus for analysis.

The NHHS retrofits will be monitored to determine their functionality for removal of nitrogen species (NH₃, NO₂-3, organic nitrogen, and TKN) and total nitrogen (TN), phosphorus species (orthophosphate and particle-bound phosphorus) and total phosphorus (TP), total suspended solids (TSS), heavy metals (Cu, Pb, and Zn), and Polycyclic Aromatic Hydrocarbons (PAHs). This list of pollutants is fairly standard except for PAHs, which are often derived from coal tar sealants used on parking lots.

To establish background concentrations for TN, TP, TSS, and heavy metals, a minimum of ten storm events will be monitored prior to construction of the retrofits; this monitoring will occur at both the control catchment and at the catchment that will be retrofitted to establish baseline concentrations and pollutant loads. Following the installation of the three bioswales, monitoring will continue for eighteen storm events (over a roughly twelve month period) at both the control retrofitted catchments for TN, TP, TSS, heavy metals, and PAHs. Storm events will be spread throughout the seasons to determine if seasonal differences in performance exist. Statistical analysis will be performed to determine the hydrologic and water quality differences between the control catchment (untreated parking lot) and the retrofitted catchment.

Since Burnt Mill Creek is 303(d) listed primarily for PAHs, analysis of the improvements in PAH concentration is warranted for this green street project. Because analysis of PAHs in stormwater is expensive, there is a lack of data in the literature. We propose monitoring 10 storm events at the control and retrofitted sites to determine the improvements in PAH concentrations from the BMPs. Monitoring would involve flow-proportional sampling at both sites. A thorough statistical analysis of these data will be performed.

22. Public Involvement

The project engages both youth and adult audiences in designing, implementing, and maintaining stormwater retrofit projects. At New Hanover High School, the team will work with science teachers to engage classes and clubs in reviewing draft designs to ensure the designs meet their needs as an outdoor laboratory, and to help with installation. Specific student groups that may be involved include the Lyceum Academy, AP Science, Earth Environmental Class (freshmen), and the Environmental Science Club. A science teacher expressed interest in engaging classes in learning how to monitor water quality, so they may have a role in the monitoring aspect of this project as well.

DREAMS administrators are very enthusiastic about engaging their teachers and students in this project. They provided this description of their experience combining arts education with environmental stewardship, and how they foresee this project helping to meet their goals:

"DREAMS has long engaged students in an environmental stewardship initiative focused on recycled art, utilizing discarded and organic materials to create both enduring and temporary works of art. Over the past year, we collaborated with the NC Aquarium at Fort Fisher to offer multiple weekly classes (recycled art, fabric art, multimedia art, mural painting, shadow puppetry, ballet, modern dance, ceramics and jewelry), facilitated by professional teaching artists, in which students were inspired to learn about our coastal environment and to create aquatic-themed art. These experiences have enabled us to blend science and art in a creative, exciting fashion that has inspired students to become more deeply engaged with their environment."

This stormwater project will enable DREAMS to create a living laboratory on the grounds of our Center. Students and teaching artists will be involved in the design and planning of the retrofits and bioretention cell. DREAMS will partner with NC Cooperative Extension and with Cape Fear Riverwatch to provide scientific education on how water is purified and cleaned, as well as other aspects of issues affecting stormwater as appropriate. Students will also participate in multidisciplinary art projects inspired by the stormwater project (i.e., outdoor art, plein air painting, etc.) that will encourage them to build a stronger connection with the environment in which they live.

This project will benefit our goals by fostering a strong connection between our students and their immediate environment. It will increase their understanding of stormwater and associated environmental issues, will provide opportunities for involvement in a citizen science project, and will inspire them to create an artistic body of work that reflects their deepened interest in and concern for our natural world."

23. List Project Outputs and Products (All 319 funded projects are required to submit Quarterly Progress Reports and a detailed Final Project Report, due by the end of the contract for DWQ review and approval.)

- Finalized New Hanover High School retrofit designs
- One or more community and/or student workshop or charettes held to develop the concept plan for DREAMS site design
- Collaboration with DREAMS teachers and classes that results in students educated about watershed science
- Concept plan and finalized DREAMS retrofit designs
- New Hanover High School parking lot bioretention retrofit installation.
- DREAMS site retrofitted with bioretention, cistern, and permeable pavement.
- Educational signs installed at New Hanover High School and DREAMS site.
- Maintenance event held at DREAMS with staff and students to teach maintenance of retrofits.
- Monitoring report summarizing pollutant removal and storm water volume reductions from New Hanover High School parking lot retrofits.
- Quarterly reports.
- Final report.

24. Projects Developing or Implementing a Watershed Restoration Plan must include EPA's 9 Key Elements for Watershed Restoration Plans. Draft Plans must be submitted to DWQ for review and approval at least *60 days before* end of the project/contract period (use additional pages if necessary).

1	An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed
2	A description of the NPS management measures that will need to be implemented to achieve load reductions as well as to achieve other watershed goals identified in the watershed based plan
3	An estimate of the load reductions expected for the management measures
4	An estimate of the amount of technical and financial assistance needed associated costs and or sources and authorities that will be relied upon, to implement the plan
5	An information/education component that will be used to enhance public understanding of the project
6	A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious
7	A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented
8	A set of criteria that can be used to determine whether loading reductions are being achieved overtime and substantial progress is being made towards attaining water quality standards
9	A monitoring component to evaluate the effectiveness of the implementation efforts over time measured against the criteria established under item 8.

1. Done and included in 2002 NCEEP Watershed plan, 2004 CAWS Report. Toxicity from PAHs is primary cause of impairment with sedimentation and nutrient enrichment from runoff as secondary. Sources of PAHs are likely coal-tar based sealants, asphalt, and automotive combustion products.
2. Done and included in 2002 NCEEP Watershed Plan and 2004 CAWS Report. Widespread retrofit BMPs required to reduce runoff volumes and remove PAHs and other pollutants. Priority should be on intercepting parking lot and road runoff to reduce PAH loading of the creek. Capturing rooftop runoff can reduce runoff volumes, nutrients and sediment.
3. In the 2002 NCEEP Watershed Plan load reductions for nutrients were estimated for proposed measures as a benchmark, with a 10% reduction goal of nutrients proposed. More recent research identified PAH removal as most important- there is no state standard for PAHs but a widely accepted reference in the U.S. is the sediment quality guideline known as the *Probable Effect Concentration(PEC)*. The PEC represents the concentration of a contaminant in bed sediment expected to adversely affect bottom dwelling organisms. The PEC for PAHs is 22.8 mg/kg. All sites monitored in Burnt Mill Creek from 2005-2008 were well above this level.
4. **2013 Update:** In delving further into investigating potential sources of PAHs, the PI acquired laboratory reports from 2005-2008 testing. These reports revealed that PAH levels reported by the monitoring contractor from 2005-2008 were at a magnitude of 1000x higher than actual levels found by the laboratory (levels were inadvertently reported as mg/kg, when they were actually micrograms/kg.). This is good news for Burnt Mill Creek, as while levels of PAHs are still high, the levels are similar to those in other urban watersheds across the U.S. and not as high as reported in the final report for the 2005-2008 project. Included in 2002 EEP watershed Plan.
5. Included in this proposal, building on current efforts.
6. Included in 2002 EEP watershed Plan.
7. Interim milestones include retrofit projects in the ground, measured reductions in runoff volumes and pollutants from retrofit projects.
So far, 8 institutional sized bioretention, 3 large wetlands, 3 permeable pavement installations, 2 large cisterns, 13 residential rain gardens, and 36 rain barrels have been installed.
8. Long term criteria for determining whether loading reductions are being achieved include BMP monitoring results for runoff and pollution reductions, and ongoing stream sampling by UNC-Wilmington. The most recent monitoring report from UNC-W did not evaluate PAHs, but found that nutrient loading and fecal coliform loading were still high. Ultimate criteria include reduced PAH levels in sediment and improved benthic macro-invertebrate populations. Benthic macroinvertebrates were last sampled in 2006. The watershed will likely need additional storm water retrofits before changes in benthic macro invertebrate populations will be seen, so sampling is recommended in the future to assess their populations.
9. Current monitoring involves monitoring reductions of volume and pollutants from retrofit projects, and ongoing stream sampling by UNC-Wilmington. Most recently, monitoring of the watershed draining to street retrofits in a controlled study revealed a 52% volume reduction at the retrofit site (treated with permeable pavement and bioretention) when comparing pre- to post-retrofit periods. Additionally, peak flow rate was reduced by 28%, albeit mostly during low intensity storm events. Sediment and sediment bound pollutants were reduced to a large extent both on a concentration and loads basis. Dissolved nutrient (NOx, PO4) concentrations remained largely unchanged. Loads of heavy metals were reduced by >80%. PAH concentrations in runoff from streets were negligible from both control and treatment site, indicating to the team that streets may not be a significant source of PAH loading.

Future monitoring efforts (after several more retrofits are completed) will include PAH stream sediment and benthic macro-invertebrates sampling.

25. References and Literature Cited

NCDENR DWQ Planning Branch. 2004. Assessment Report: Biological Impairment in the Burnt Mill Creek Watershed. Collaborative Assessment of Watersheds and Streams (CAWS) project. 110 pp.

NCDENR DWQ Basinwide Planning Unit. 2005. Cape Fear River Basinwide Water Quality Plan.

NCDENR NC Wetlands Restoration Program (current Ecosystem Enhancement Program). 2002. New Hanover County Local Watershed Planning Initiative: Causes and sources of Water Quality Degradation in Burnt Mill Creek, Lower Smith, and Prince George Creeks. KCI Associates for NCWRP.

Mallin, M.A., L.B. Cahoon, Posey, et al. 2007. Environmental Quality of Wilmington and New Hanover County Watersheds 2006-2007. Center for Marine Science, UNC-Wilmington.

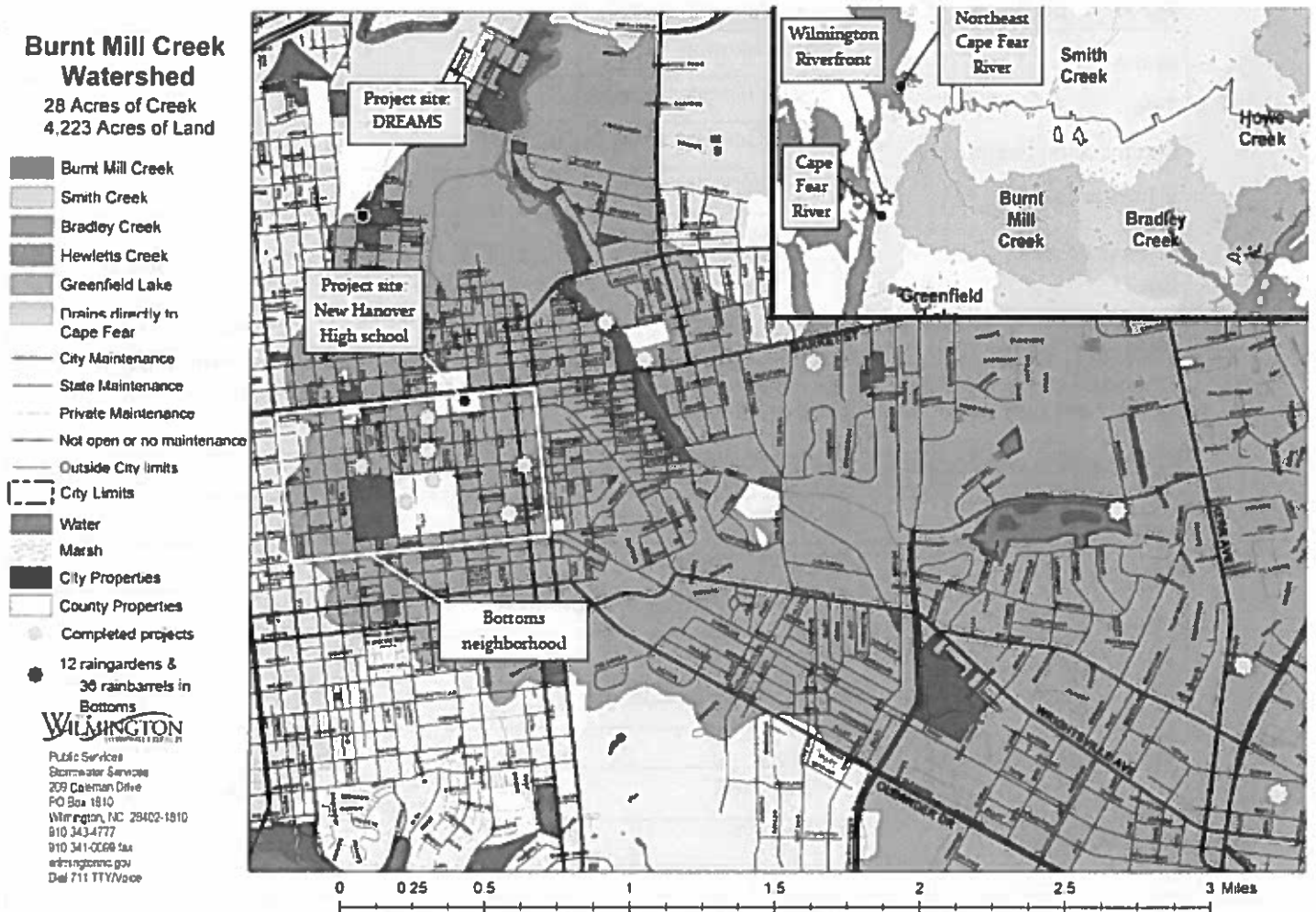
Perrin, Christy. 2012. Polycyclic Aromatic Hydrocarbons (PAHs) in Urban Waters. NC Cooperative Extension, AG-588-25. NC State University, Raleigh. Online at:
<http://weco.wordpress.com/2012/10/31/pahs-in-urban-waterways/>

Perrin, C., Winston, R., Beggs, P., Hunt, B. 2009. Planning for Reducing Stormwater Runoff and Toxicity in Burnt Mill Creek Watershed. Final Report for CWMTF Grant 2007-812. Online at
www.ncsu.edu/WECO/burntmill

Perrin, C.A.; Wright, J.; Hunt, W.F.; Beggs, P.G.; Mallin, M.; Burchell, M. 2008. Restoring the Burnt Mill Creek Watershed through Stormwater Management and Community Development. Final EPA 319 Report to NC Division of Water Quality. Online at www.ncsu.edu/WECO/burntmill

Watershed Education for Communities and Officials and NC Wetlands Restoration Program. 2002 Watershed Plan Summary for the Hydrologic Unit Containing Burnt Mill, Upper and Lower Smith, Prince George.

Figure: Map of Burnt Mill Creek watershed with past and proposed projects



Project I-4: Cleaning Up the Water around Oak Island, NC

1. Project Title	Cleaning Up the Water Around Oak Island, NC
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2a. Grantee Primary Contact or Project Manager¹			
Name	Tracy Skrabal		
Title	Senior Coastal Scientist		
Organization Name	North Carolina Coastal Federation		
E-mail address	tracys@ncccoast.org		
Mailing Address	3609 Highway 24 (Ocean)		
City	Newport	State	NC Zip 28570
Telephone	252-393-8185	Fax Number	252-393-7508

¹ A one-page Statement of Qualifications must be provided in Section 3 of the application form to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.

2b. Grantee Execution Address (where contract will be mailed for signature)			
Name Title	Todd Miller		
Organization Name	Executive Director		
E-mail Address	North Carolina Coastal Federation		
Mailing Address City	toddm@ncccoast.org		
Telephone	3609 Highway 24 (Ocean)		
Federal Tax ID Number	Newport	State	NC Zip 28570
	252-393-8185	Fax Number	252-393-7508
	58-1494098		

2c. Grantee Payment Address (where invoice payments will be mailed)			
Name Title	Rachael Carlyle		
Organization Name	Director of Operations		
E-mail Address	North Carolina Coastal Federation		
Mailing Address City	rachaelc@ncccoast.org		
Telephone	3609 Highway 24 (Ocean)		
	Newport	State	NC Zip 29570
	252-393-8185	Fax Number	252-393-7508

REDACTED

Exemption 6 Personal Privacy

3. Required Statement of Qualifications (to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.)

Lead staff on this project for the N.C. Coastal Federation will be:

(1) Tracy Skrabal, Southeast Regional Manager and Senior Coastal Scientist, joined the federation's staff in 1997.

(2) Ted Wilgis, Coastal Education Coordinator, joined the federation in 1997.

(3) Todd Miller, Executive Director, founded the federation in 1982.

(4) Lauren Kolodij, Deputy Director,

(5) Mike Giles, Southeast Coastal Advocate,

(6) Larry Sneed, PE, is the owner of Coastal Stormwater Services, Inc.

Dare County First Flight Schools Master Plan 2011 Lockwood Folly Watershed Restoration Plan Implementation Project (underway) Implementing Low Impact Development to Protect and Restore Water Quality in N.C. (underway)			
319(h) Grant Funds Requested	\$114,694		
Match funds or in-kind Match Services	\$77,371	5. Type of Project (check one) <input checked="" type="checkbox"/> Development or implementation of a Watershed Restoration Plan <input type="checkbox"/> Development or implementation of a TMDL <input type="checkbox"/> Other: (please indicate)	
4. Total Project Cost	\$192,065		

6. Project Start Date	January 1, 2014	Project End Date	December 31, 2016
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7. Geographic Coverage	Statewide	Regional	Watershed X	Site Specific X
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8. Project Location – REQUIREMENT: Important to submit as completely as possible, especially the Lat/Long coordinates and 303(d) List Assessment Unit Number. (NOTE: Payment of 319 Invoices will be held if all required information is not submitted in quarterly reports and the final reports, AU numbers, Lat/Long, and coordinates for all installed BMP practices)	
River Basin(s)	Lumber River Basin
Watershed(s)	Lockwood Folly River watershed
Watershed size	Long Bay Subbasin, Oak Island, 9.1 sq. mi.
303(d) listed Stream	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
303(d) List Assessment Unit Number	15-25-1-3 (v)
HUC(s) (12 digit USGS Hydrologic Unit Codes)	030402080110, 01-06
County	Brunswick County
USGS. 7.5 minute topographic quadrangle map(s) in project area	Lockwood Folly Revision 1 2013
Position coordinates of project location	Latitude 33°54'59"N Longitude - 78°7'50"W

9. NPS Pollution Sources to be addressed (Check all that apply)

	Agriculture		Waste Disposal (includes onsite systems)
X	Construction	X	Hydrologic Modification
	Silviculture		Marina and Recreational Boating
X	Urban runoff/Stormwater		Groundwater Loading
	Resource Extraction	X	Natural Sources
X	Habitat Modification (drainage/filling wetlands, stream bank destabilization)		Other:

10. NPS Pollutants to be addressed (check all that apply)

X	Excess Nitrogen		Pesticides
X	Excess Phosphorus		Oil and grease
X	Sedimentation		Temperature
X	Pathogens/Bacteria		pH
	Metals		Alterations
	Low dissolved oxygen		Other:

11. Estimate Load Reduction, if checked for excess nitrogen, excess phosphorus and/or sedimentation²

# pounds of nitrogen saved from project implementation 3.1712536 lbs. for each 1-yr, 24-hour storm event	Nationwide Urban Runoff Study, US EPA 1983
# pounds of phosphorus saved from project implementation .639258 lbs. for each 1-yr, 24-hour storm event	Reference: see above
# tons of soil saved from project implementation 168.5552 lbs. per 1yr, 24-hour storm event	Reference: see above
Load Reduction Model Used: STEPL, Other	Other, calculated based upon medium concentration in urban stormwater assuming 200,000 gallon reduction during 1-year, 24-hour storm event.

² Providing a load reduction estimate is required for all BMP implementation projects, including demonstrations.

12. Do you intend for collected data to be used by DWQ for Use Support decisions?

No

13. Do you propose to install BMPs or other ag management measures that would be eligible for NC Agricultural Cost Share Program (ACSP) funding? If Yes, please document that the demand for ACSP funding in your county exceeds the supply, prompting your application for a 319(h) grant.

Yes

No X

14. Does this proposal address needs that were identified in a DWQ basin plan? If yes, please identify the specific need and the basin in which the need is outlined.

Yes

The project restores and protects water quality by restoring hydrology that has been modified by past land uses. This is identified in the Lumber Basinwide Plan on pgs. 130-135, Chapter 10. The project area is located within the Long Bay Subbasin (03040208). All receiving waters in the subbasin are considered impaired for shellfishing because they are either prohibited or conditionally approved and stormwater is identified as the main culprit. Page 79 of the Long Bay subbasin chapter of the Lumber Plan identifies the TMDL Implementation Plan as "a local watershed plan for the Lockwood Folly watershed created by the federation, N.C. EEP, N.C. DOT, N.C. Shellfish Sanitation and a local engineering firm", funded by the 319 program in 2007. It recommends retrofits to prevent stormwater from entering shellfish (SA) waters. Page 87 identifies the federation and partners' plan under the 319-funded projects.

15. Project Abstract (short concise summary of the project – DO NOT EXPAND SPACE PROVIDED)

The N.C. Coastal Federation works with Brunswick County, the Town of Oak Island, local communities and numerous partners to address declines in water quality. This project continues these collaborative efforts with additional private stakeholders to carry out actions outlined in the Lockwood Folly TMDL Implementation Plan. N.C. DWQ and EPA accept this Total Daily Maximum Load (TMDL) implementation plan as a watershed restoration plan because it specifically incorporates the required Nine Elements.

This project will reduce polluted stormwater runoff entering into the impaired coastal SA waters of the Lockwood Folly River watershed by constructing stormwater infiltration practices (SIPs) on public lands including street right-of-ways owned by the Town of Oak Island, and by encouraging private landowners to install SIPs within an approximate 70-acre project area that contains about 425 residential lots and five city streets. This projects implements elements of the watershed restoration plan that was completed to carry out the TMDL developed for these waters in 2010. To comply with the plan, it is essential to reduce the existing volume of polluted stormwater that flows into coastal waters. The project will:

- (1) Reduce polluted stormwater entering the receiving SA waters next to Oak Island by at least 200,000 gallons during a 1-year, 24-hour storm by installing SIPs on city properties and street right-of-ways;
- (2) Engage community stakeholders to build support, buy-in, participation and ownership of the results. This includes widespread public education and community outreach with homeowners to encourage voluntary installation of SIPs of private lands; and
- (3) Use land use estimates of stormwater runoff volumes and the N.C. DWQ approved LID-EZ modeling tool to calculate the degree to which retrofits installed as a result of this project result in a level of stormwater management comparable to what is required of new development that must comply with the Coastal Stormwater Rules for SA waters. This will provide a useful measure of whether enough retrofits have been done within these lands to protect and restore water quality standards.

This project provides a model on retrofitting coastal watersheds to remove water quality impairments.

16. Funding Requested

Budget Categories (itemize all categories)	Section 319				Non-Federal Match *				Total	Justification (Include detailed explanation for each budget line item)
	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4		
Personnel/Salary	4,271	17,085	12,814	8,542	6,046	24,184	18,138	12,091	103,171	Please see attached spreadsheet for staff hours and duties
Fringe Benefits	641	2,563	1,922	1,281					6,407	15% of salaries, includes FICA, 3% SEP, etc.
Supplies	670	2,680	2,010	1,340					6,700	Maps, printing and design, meeting supplies
Equipment									0	N/A
Travel	1,000	2,000	2,000	1,000					6,000	Project travel (state per diem rates)
Contractual	5,287	21,150	15,863	10,575	2,000	4,000	4,000	2,000	64,875	Hydrologic modeling, design/install SIPs, reporting, Oak Island
Other									0	N/A
Total Direct	11,869	45,478	34,609	22,738	8,046	28,184	22,138	14,091	187,153	
Indirect (max. 10% of direct costs, per 40 CFR 35.268)	0	0	0	0	491	1,965	1,474	982	4,912	Calculated as 10% of salary and wages (match)
Annual Totals	11,869	45,478	34,609	22,738	8,537	30,149	23,612	15,073	192,065	
Grand Total	114,694				77,371				192,065	
% of Total Budget	60%				40%				100%	

*Note: Non-Federal match must be a minimum of 40% of the total project budget

Year 1: January 1 - June 30, 2014 (6 months) – Total MUST equal sum of quarters 1-2 in Milestone Table #20

Year 2: July 1, 2013-June 30, 2015 (12 months) – Total MUST equal sum of quarters 3-6 in Milestone Table #20

Year 3: July 1, 2014-June 30, 2016 (12 months) – Total MUST equal sum of quarters 7-10 in Milestone Table #20

Year 4: July 1 - December 31, 2016 (6 months) – Total MUST equal sum of quarters 11-12 in Milestone Table #20

17. Budget Summary (Combined federal and match funds)

	BMP Implementation	Project Management	Education Training or Outreach	Monitoring	Technical Assistance	Other	Total
Personnel	42,827	8,336	25,358	11,233	15,417	0	103,171
Fringe Benefits	3,844	320	1,280	321	642	0	6,407
Supplies	0	600	6,100	0	0	0	6,700
Equipment	0	0	0	0	0	0	0
Travel	1,200	1,500	1,800	1,000	500	0	6,000
Contractual	50,000	0	6,775	7,500	600	0	64,875
Operating Costs	0	0	0	0	0	4,912	4,912
Other	0	0	0	0	0	0	0
Total	97,871	10,756	41,313	20,054	17,159	4,912	192,065

18. Local and State Match (non-federal) Summary

Total Match amount	\$77,371
Cash Match	\$50,000
In-kind Match	\$27,371
Source(s) of Cash Match	N.C. Coastal Federation-private foundation cash match to support restoration in the southeast region.
Source(s) of In-kind Match	Town of Oak Island staff time, technical assistance and equipment use Federation community volunteers—480 hours over 3 years at the 2012 federal volunteer rate of \$22.14/hr. for monitoring, outreach and SIP installation.

19. Project Partners (may add more, if needed)³			
Agency Name	Town of Oak Island		
Agency Address	4601 East Oak Island Drive, Oak Island, NC 28465		
Role/contribution to Project	Local government input, project team, implementation		
Contact Person	John Michaux, Public Works Manager	Phone No.	910-201-8008
E-mail address	jmichaux@ci.oak-island.nc.us		
Agency Name	Brunswick County Cooperative Extension		
Agency Address	25 Referendum Drive, Bolivia, NC 28422		
Role/contribution to Project	Community outreach		
Contact Person	Sabrina Woofter	Phone No.	910-263-2650
E-mail address	Sabrin_woofter@ncsu.edu		
Agency Name	Coastal Stormwater Services		
Agency Address	311-*F Judges Road, Wilmington, NC 28405		
Role/contribution to Project	Design, engineering and installation of stormwater retrofits		
Contact Person	Larry Sneed, PE	Phone No.	910-520-1835
E-mail address	lsneed@coastalstormwater.com		

³ A one-page Statement of Qualifications must accompany applications to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.

- (1) *Please see attached letters of support from Oak Island and Cooperative Extension, as well as from UNCW Dr. Mike Mallin, who has been part of the overall effort in Brunswick and New Hanover Counties. Statements of Qualifications for Larry Sneed, PE, and federation project lead Tracy Skrabal are attached.

20. Project Milestone Schedule

Time Period/Date	Activities (List specific quantifiable outputs or activities that will be achieved during each quarter)	Anticipated % of Requested Funding Spent
First Quarter Jan-Mar 2014	<ul style="list-style-type: none"> Assemble project team and hold first meeting (including the federation, Town of Oak Island Public Works Department, Brunswick County Engineering Department, Brunswick County (NCSU) Cooperative Extension Service; Town of Oak Island Stormwater Management Citizens Committee) Define project boundaries Develop and execute all project partner agreements and contracts Issue press release announcing project Outline timeline and responsibilities for education and community engagement objectives 	<p>5% =\$5,735</p> <p>(5% Total) \$5,735</p>
Second Quarter Apr-June 2014	<ul style="list-style-type: none"> Project teams meet to begin identification of potential priority stormwater infiltration practices (SIPs) within project boundaries Evaluate potential project engineers/contractors Update/ Modify <u>Do It Yourself Solutions to Stormwater Pollution</u> Guide to reflect locality Coastal Review Online website article on project 2nd annual Community Clean Water Celebration Submit quarterly report 	<p>5.3%=\$6,134</p> <p>(10.3% Total) \$11,869</p>
Third Quarter July-Sept 2014	<ul style="list-style-type: none"> Project team meets to continue identification of potential priority SIP sites Evaluate water quality benefits of all project sites, prioritize and select project sites Select project engineer/contractor Print 1,000 copies of <u>Do It Yourself Solutions to Stormwater Pollution</u> Guide Project presentation to community group and Town Submit quarterly report Develop monitoring plan 	<p>10%=\$11,469</p> <p>(20.3% Total) \$23,338</p>
Fourth Quarter Oct-Dec 2014	<ul style="list-style-type: none"> Project team meets to finalize selection of priority project sites Project engineer develops engineering plans/specifications if necessary Submit applications for necessary permits if necessary Articles developed for local media and community newsletters Distribute at least 200 copies of <u>Do It Yourself Solutions to Stormwater Pollution</u> Guide to homeowners in proximity to retrofits sites Finalize monitoring plan; begin pre-project monitoring Submit quarterly report 	<p>15%=17,204</p> <p>(35.3% total) \$40,542</p>
Fifth Quarter Jan-Mar 2015	<ul style="list-style-type: none"> Receive permits if necessary (many SIPs will not require permits) Finalize contractor selection Finalize pre-project monitoring Submit quarterly report 	<p>5%=\$5,735</p> <p>(40.3% Total) \$46,277</p>

Sixth Quarter Apr-Jun 2015	<ul style="list-style-type: none"> • Project team meets to coordinate construction, monitoring, outreach and education progress • Begin installation of SIPs • Develop and release press releases and coordinate media coverage • 3rd annual Community Clean Water Celebration Event • Distribute at least 200 copies <u>Do It Yourself Solutions to Stormwater Pollution</u> Guide to homeowners in proximity to retrofit sites • Assist with articles for web pages and community newsletters • Submit quarterly report 	9.7%=\$11,070 (50% Total) \$57,347
Seventh Quarter July-Sept 2015	<ul style="list-style-type: none"> • SIP installations continue • Continue to coordinate media coverage and community outreach • Submit quarterly report 	10%=\$11,469 (60% total) \$68,816
Eighth Quarter Oct-Dec 2015	<ul style="list-style-type: none"> • Complete installation of all SIPs • Initiate post-construction monitoring • Estimate and calculate the degree to which installed SIPs retrofits sufficiently protect and restore water quality standards using land use estimates and the LID-EZ modeling tool • <i>Coastal Review Online</i> website article on project • Conduct Public Backyard Stormwater Reduction Tour of newly constructed and existing SW BMPs and restoration project in the Lockwood Folly Watershed • Distribute 200 copies <u>Do It Yourself Solutions to Stormwater Pollution</u> Guide • Submit quarterly report 	10%=\$11,469 (70% Total) \$80,285
Ninth Quarter Jan-Mar 2016	<ul style="list-style-type: none"> • Project team meets to coordinate monitoring, outreach and education efforts • Continue post-construction monitoring • Submit quarterly report 	5%=\$5,735 (75% Total) \$86,020
Tenth Quarter Apr-June 2016	<ul style="list-style-type: none"> • Continue post-construction monitoring • Project street signage and yard signs developed and installed. • Project presentation to community groups and Town • Submit quarterly report 	5.2%=\$5,936 (80.2% Total) \$91,956
Eleventh Quarter July-Sept 2016	<ul style="list-style-type: none"> • Continue post-construction monitoring • <i>Coastal Review Online</i> website article on project • Project presentation to public officials, community groups within the watershed • Distribute 200 copies of <u>Do It Yourself Solutions to Stormwater Pollution</u> Guide • Submit quarterly report 	5%=\$5,735 (85.2% Total) \$97,691
Twelfth Quarter Oct-Dec 2016	<ul style="list-style-type: none"> • Complete post-construction monitoring • Complete monitoring data analysis/report • Prepare/ Submit final report 	14.8%=\$17,003 (100% Total) \$114,694

21. Background and goals of the project. Expand space, if necessary

Most unaltered coastal watersheds in N.C. have very little surface runoff. Significant increases in the volume of surface runoff result when natural hydrology is modified by land uses. This increased surface runoff contaminates coastal waters with unacceptable amounts of fecal coliform and enterococci bacteria. This is the pollutant that is causing water quality impairments that is identified in the Lockwood Folly River TMDL and TMDL Implementation Plan. Polluted runoff is one of the primary causes of impaired shellfish and swimming waters along our coast. Restoring or replicating natural watershed hydrology is essential to restoring impaired waters in both developed and rural areas. Low Impact Development (LID) offers highly effective approaches to reduce runoff pollution and protect water quality in these areas. For developed areas, installing stormwater infiltration practices (SIPs) is essential to reduce the volumes of polluted runoff to restore water quality.

Devising economical and effective ways to reduce polluted runoff to protect and restore water quality standards for SA waters by retrofitting watersheds to replicate natural hydrology is a huge challenge. Estimates of the costs of installing infiltration retrofits vary widely, with ranges for the Chesapeake Bay watershed varying from \$20,000 to \$50,000 per acre treated according to recent EPA and private studies. University studies around the country report varying costs for infiltration retrofits (rain gardens and larger infiltration devices) ranging from approximately \$5.00 to \$20.00 per gallon of stormwater for the 1-year, 24-hour design storm. Applying these cost estimates very conservatively to the estimated 70 acres within the boundaries of the project area within the Town of Oak Island would result in estimated costs of more than \$1.4 million to completely retrofit this drainage area to provide sufficient infiltration to comply with SA water quality standards. This estimate is based upon N.C.'s coastal design storm and stormwater standards for new development draining to SA waters. At this average cost per acre, it will not be affordable to install a sufficient number of stormwater retrofits to restore water quality at the watershed scale. Clearly, much more economical approaches must be developed to infiltrate stormwater in existing coastal communities if water quality impairments are to be removed.

Since February 2005, the Brunswick County Commissioners have been attempting to devise affordable strategies to restore water quality in the Lockwood Folly watershed. It appointed an eight-member Lockwood Folly River Watershed Roundtable. The Roundtable was funded with an EPA watershed grant, and it developed a set of strategies to protect and restore water quality in the river. The strategies were accepted by the county commission in early 2007.

Soon after, the NOAA/DWQ Coastal Non-point Source Program funded the N.C. Coastal Federation to work with Brunswick County, New Hanover County and the City of Wilmington to develop a Low Impact Development (LID) ordinance, which was one of the roundtable's strategies. The federation contracted with a national LID expert (Larry Coffman) to help develop draft manuals and supporting resolutions for the local governments. Each local government empaneled a technical advisory committee made up of engineers, developers, Realtors®, county staff and planners and other local interests. In December 2008 the voluntary LID manual was unanimously adopted by Brunswick County. This strategy is designed to help protect the river from additional pollution, but it does not deal with existing problems.

To address existing pollution, the federation also received a grant in 2008 from the N.C. Attorney General's Environmental Enhancement Grant (EEG) program to design and install a series stormwater reduction retrofits at the county office complex in Bolivia, which was also identified by the roundtable as a site for such retrofits. Brunswick County served as project partner and together the team used LID techniques to mitigate existing sources of pollution in the river.

To further understand what needed to be done to clean up existing pollution and to implement another recommendation of the Roundtable, the federation received a 319 grant from N.C. DWQ to work with Stantec to develop a Total Daily Maximum Load (TMDL) and TMDL Implementation Plan/Watershed

Restoration Plan for the river. This project found that 94% of developed land needs to be targeted for stormwater reduction retrofits to infiltrate the 1-year, 24-hour storm.

The Lockwood Folly River watershed restoration plan found that much of the development in the watershed is residential and that small scale retrofits on existing land uses is the primary way to achieve this needed reduction in stormwater runoff. The plan also found that larger stormwater reduction measures in priority locations could reduce the amount of existing stormwater runoff.

Most recently, the federation and its partners received supplemental 319 funding in 2011 to further the goals of the Lockwood Folly River Implementation Plan. This project is currently underway, and includes two elements that relate to this project: Designing, implementing and evaluating a community-based stormwater reduction retrofit program to help landowners install low-cost stormwater reduction retrofits; and assisting the Town of Oak Island to design and install stormwater reduction retrofits.

GOALS:

This project will reduce polluted stormwater runoff entering into the impaired coastal SA waters of the Lockwood Folly River watershed by constructing stormwater infiltration practices (SIPs) on public lands including street right-of-ways owned by the Town of Oak Island, and by encouraging private landowners to also install SIPs. This projects implements elements of the watershed restoration plan that was completed to carry out the TMDL developed for these waters in 2010. To comply with the plan, it is essential to reduce the existing volume of polluted bacteria rich stormwater that runs off into coastal waters from previously developed lands.

Project goals include:

- (1) Reduce polluted stormwater entering the receiving waters around Oak Island by at least 200,000 gallons during a 1-year, 24-hour storm by installing low cost, economical SIPs on city-owned properties and street right-of-ways;
- (2) Engage community stakeholders to support and participate in efforts to reduce the volume of stormwater flowing off their properties. This will be accomplished by reaching out homeowners to encourage voluntary installation of SIPs of private lands; and
- (3) Use land use estimates of stormwater runoff volumes and the N.C. DWQ approved LID-EZ modeling tool to calculate the degree to which retrofits installed as a result of this project result in stormwater management that is comparable to what is required of new development that must comply with the Coastal Stormwater Rules for SA waters. This will provide some measure of whether enough retrofits have been done within these lands to protect and restore water quality standards.
- (4) Estimate the cost per gallon infiltrated to determine if this strategy for conducting retrofits on public lands and private properties yields an affordable approach to carrying out watershed restoration plan.

22. A detailed description of the project. Note: If project entails developing or implementing a Watershed Restoration Plan, see section 27. Expand space, if necessary

The project includes the following elements:

- (1) Select project boundaries. The project team will select a geographic area within the Town of Oak Island to focus project tasks. This will most likely include at least five streets and city blocks that connect East Oak Island Drive with East Yacht Drive, and the area will include approximately 70 acres of land. Development patterns include typical lot sizes that average 6,000 square feet, or approximately five to seven residential lots for each acre. City streets in the project area are approximately 2,000 feet long, and are designed with roadside ditches that drain directly to SA

waters. The soils within the project area will be generally suitable for use of SIPs since the project team wants to focus this work within areas of the town that will be most cost-effective to retrofit. By using the low impact development permitting tool approved by N.C. DWQ called LID-EZ, preliminary estimates are that the volume of runoff during the 1-year, 24-hour storm event will need to be reduced by nearly 2 million gallons to result in land uses that do not impair SA water quality.

- (2) Achieve polluted stormwater volume reduction goal of at least 200,000 gallons for 1-year, 24-hour storm by installing stormwater infiltration practices (SIPs) on public properties focusing on Town of Oak Island street right-of-ways within the project boundary. Through a collaborative process, the project team (N.C. Coastal Federation, the Town of Oak Island Public Works Department, the Oak Island Stormwater Management/Estuarine Shoreline Citizens Committee, the N.C. Community Conservation and Assistance Program, the Brunswick County Engineering Department, and the Brunswick County (NCSU) Cooperative Extension Office) will identify and implement SIPs on property owned by the Town of Oak Island. The retrofits will be installed along at least five public streets connecting East Oak Island Drive with E. Yacht Drive, reducing the runoff from public and private sources currently flowing directly to SA waters. The project team will attempt to identify and design SIPs that are very low cost to install and maintain, such as very low elevation check dams placed within the existing roadside ditches that will slow runoff and allow it to infiltrate.
- (3) Implement broad-based education and outreach. The education and outreach effort will focus on the measures completed during this project as well as existing LID stormwater reduction measures installed within the watershed. These will provide numerous opportunities to educate homeowners and public officials about stormwater and techniques for preventing and reducing it on private and public properties. In addition to the water quality protection goal, the ability to use numerous, concentrated project sites for education, outreach and replication for citizens, businesses, and local governments will be a critical component in the project. Specific project deliverables include a backyard stormwater reduction tour; distribution of the *Do-It-Yourself Solutions to Stormwater Pollution* guide; community clean water days; interpretive signage; presentations to local groups and governments; student education and articles in the federation's online news service, written by professional reporters. See the Public Involvement (section 24) for details of these efforts. Homeowners will be asked to report to the project team the installation of any SIPs they install on their own properties. This will enable the project team to factor into its evaluation of the project any stormwater volume reductions that have been achieved by homeowners within the project area.
- (4) Measure restoration success. This will be accomplished by engaging town officials and community residents in pre- and post- implementation flow and photographic monitoring coordinated with rain gauge monitoring, designed to quantify and gauge the effectiveness of the completed projects in reducing stormwater runoff volumes.
- (5) Evaluate cost-effectiveness of retrofits. Final costs of SIPs installed will be measured and evaluated against water quality benefits received to develop recommendations for widespread application on public and private properties throughout this and other watersheds. This will be done by using aerial photography to estimate existing land uses and runoff coefficients, and by using the LID-EZ spreadsheet model to estimate the adequacy of installed retrofits for protecting SA water quality. The LID-EZ model will evaluate existing development and streets as if they were a new subdivision development, and determine the degree to which installed SIPs are sufficient to comply with the Coastal Stormwater rules. This will provide a way to estimate the cost per acre and gallon to provide adequate retrofits for existing development to comply with water quality standards.

(6) Report project results. Quarterly reports and a final report will be produced for the project. The project team will look for opportunities to report project results across the state of N.C. and nationally.

23. Monitoring/Environmental Data Collection. Describe in section below how project data will be used (i.e. demonstrate effectiveness of BMPs installed, calculate load reductions, data to be used for TMDL development, data to be used for State use support purposes, etc.). If monitoring is needed to document a demonstration project or water quality improvement, a Quality Assurance Project Plan (QAPP) will be required (reviewed and approved by DWQ). For a QAPP template, visit the 319 Program website at <http://portal.ncdenr.org/web/wq/ps/nps/319program/applyfor319>

The proposed monitoring effort for this project is designed to achieve two objectives:

1. Evaluate effectiveness of project retrofits in achieving volume reductions, with associated water quality benefits; and
2. Engage citizen volunteers in the monitoring program, thus providing education and stewardship training to property owners within the region.

Monitoring protocols will be designed by the project team and incorporated into an approved QAPP to include:

1. Pre-and post-project flow measurements to measure inputs and outputs of stormwater runoff, and calculating volume reductions;
2. Photographic documentation by citizen volunteers of the pre-and post-storm project areas, to evaluate effectiveness of the volume reduction strategies;
3. Rain gauge measurements taken after every storm during the monitoring period, to correlate with flow measurements and photographic monitoring efforts.

Monitoring results will be used to evaluate the extent to which installed SIPs result in compliance with SA water quality standards. This will be evaluated by using aerial photos of existing land use, assigning standard runoff coefficients based upon land use percentages, and then modeling compliance with water quality standards by using the N.C. DWQ approved permit application tool called LID-EZ. This will indicate how much runoff from within the project boundaries must be infiltrated to achieve water quality standards and the extent to which projects has achieved these reductions with its installed SIPs. Based upon these results, the project team will then be able to calculate an estimated cost per acre and gallon to achieve sufficient retrofits within the project area to comply with SA water quality standards. This information will help to determine how best to proceed with further retrofits within the Town, throughout the watershed, and in other coastal watersheds as well.

24. Public Involvement

Results of this work will be communicated to the public in clear and understandable language, using the federation and its partners' outreach networks. This will be accomplished by completing the following tasks:

- (1) SIP Tour. A tour of existing SIPs installed in the Lockwood Folly River watershed will be conducted for residents, officers of homeowner associations, local officials, and others. It will begin with a presentation and introduction at the Cooperative Extension office in Bolivia in the headwaters of the watershed. Tour participants will then travel to a selection of projects.
- (2) Low Impact Development and Backyard Stormwater Retrofit Homeowners Guide. The guide will provide a "how to" manual on selecting and designing the correct stormwater measure for a home that is being constructed or that is already constructed. The guide will contain a "fact sheet" that will describe each SIP practice, the purpose and best use, design, installation and maintenance. The guide will also be regionally focused with information and resources on suppliers, designers, contractors, native plant suppliers and agency contacts. The guide will also provide information on coastal water quality. It will be placed on the web and provided in printed form for the Town to distribute to homeowners.
- (3) Community Clean Water Days and Celebration. These Days will be held for volunteers to help with SIP installations. An annual Community Clean Water Celebration for all the watershed communities will be held each spring during the project period. The event will feature a volunteer rain garden planting, educational exhibits and SIP demonstrations, and kids' activities.
- (4) Project SIP signage. Educational signs will be designed and installed at all the project SIPs. In addition, homeowners who implement a SIP will be provided with a yard sign stating "My yard protects our coast" and with project partner contact info on the sign.
- (5) Presentations to Groups. Presentations on SIPs will be given to at least five neighborhood and community groups in the watershed.
- (6) Coastal Review Online. Information on the project will be disseminated on the federation website (10,000 hits a week), including three features written by professional reporters on our daily online news service, the *Coastal Review Online*, and other partner websites and social media outlets.
- (7) Student Education. The federation has an active stormwater education program in schools throughout the region. The Schoolyard Rain Garden and Students Restoring Community Creeks Programs will use education materials and resources from the project to reach 1,000 students during the project.
- (8) Peer-to-Peer Engagement. Project team members will disseminate lessons learned through local governments, realtors, and councils of governments.

25. List Project Outputs and Products (All 319 funded projects are required to submit Quarterly Progress Reports and a detailed Final Project Report, which must be submitted at least *30 days before* the end of the contract for DWQ review and approval.)

- (1) Reduce in volume of polluted stormwater runoff. The SIPs installed by this project will reduce the flow of polluted runoff by at least 200,000 gallons during a 1-year, 24-hour design storm event. The success of this project will be publicized through its extensive outreach and education program. This will help to replicate results elsewhere in the Town, the watershed, and in other coastal watersheds in N.C.
- (2) Collaborate among state agencies, local governments, stormwater practitioners, and conservation groups. The project provides support for continued and strengthened collaboration, outreach and education efforts by members of the project team, and will provide a good working model for how these types of efforts can be conducted in other watersheds.
- (3) Improve understanding of how to design and construct relatively low-cost SIPs to improve impaired coastal waters. The project will include highly visible demonstration projects, engineering and design information, cost/benefit data, and monitoring results to the public, government and elected officials and design engineers. The simple guide that will be distributed and other outreach efforts are designed so the lessons learned from this project will lead to replication of the techniques on a watershed-wide basis.
- (4) Increase knowledge, involvement and stewardship by the public, elected leaders and government officials. Through the successful completion of previous watershed planning, TMDL, and retrofit projects within the Lockwood Folly River watershed, there has been a significant increase in public and government awareness and interest in stewardship opportunities around the goal of improving and protecting water quality. This project will expand these partnerships and understanding, and integrate these successful demonstration projects within new and existing neighborhoods and public and commercial properties throughout the watershed.

26. Projects Developing or Implementing a Watershed Restoration Plan must include EPA's 9 Key Elements for Watershed Restoration Plans. Draft Plans must be submitted to DWQ for review and approval at least *60 days before* end of the project/contract period.

NOTE: Please provide information on the following ONLY if applying for Incremental funds to develop or implement a Watershed Restoration Plan: (use additional pages if necessary)

	This project is based upon the Lockwood Folly River TMDL Implementation Plan, which <u>includes EPA's nine key elements for watershed restoration plans</u> . N.C. DWQ has indicated the EPA accepts this TMDL implementation plan because of its explicit inclusion of the nine elements.
1	<p>An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed</p> <p>The basinwide plan for the Lumber River watershed and all of its subbasins, including the one in which Oak Island is located, has identified stormwater as the primary driver behind the impairments to shellfishing waters. Previous EPA-approved work conducted by the federation indicates that reducing VOLUME of stormwater achieves the pollutant load reduction targets in a more efficient way than attempting to control or treat sources.</p>
2	<p>A description of the NPS management measures that will need to be implemented to achieve load reductions as well as to achieve other watershed goals identified in the watershed based plan.</p> <p>N.C. DWQ has concluded that infiltration of stormwater using stormwater infiltration practices (SIPs) is critical to protecting and restoring SA water quality. These measures include a wide variety of infiltration practices, including vegetated swales designed to store and infiltrate runoff, infiltration basins, rain gardens, and cisterns and rain barrels that slowing release capture water after rainfall events.</p>
3	<p>An estimate of the load reductions expected for the management measures.</p> <p>Infiltrated stormwater removes essentially 100 percent of the pollution load carried by surface runoff. It is the only practical strategy for dealing with natural occurring bacteria loadings in coastal waterways.</p>
4	<p>An estimate of the amount of technical and financial assistance needed associated costs and or sources and authorities that will be relied upon, to implement the plan</p> <p>Federation staff has many years' experience in conducting all aspects of projects such as this one, from organizing community outreach to reviewing the engineering, design and construction of community retrofits. This region has been a target area for long-term restoration work by the project partners. Coastal Stormwater, the engineering firm that will be doing the engineering and construction, is a long-term collaborator with project partners with in-depth knowledge of the local soils and water table issues. The local governments and cooperative extension partners have in-depth local knowledge. All partners' talents and knowledge bases will be tapped for the project.</p>
5	<p>An information/education component that will be used to enhance public understanding of the project</p> <p>The federation and partners will use their outreach capacity to distribute project information. Please see section 24 for details.</p>
6	A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious

	Please see the milestone schedule in section 20. Retrofits will be completed by year 2; post-project monitoring and outreach will continue in year 3.
7	<p>A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented.</p> <p>Quarterly reports and the final report will evaluate the status of each project element, and whether or not project milestones identified in Section 20 are being achieved.</p>
8	<p>A set of criteria that can be used to determine whether loading reductions are being achieved overtime and substantial progress is being made towards attaining water quality standards.</p> <p>The existing coastal stormwater runoff rules for new development provide the design storm and design standards that will be used to evaluate if the SIPs installed by the project are sufficient to protect and restore SA water quality standards. The use of N.C. DWQ accepted LID-EZ to model whether or not sufficient SIPs have been installed to achieve water quality standards provides a simple tool for evaluating water quality benefits of the project.</p>
9	<p>A monitoring component to evaluate the effectiveness of the implementation efforts over time measured against the criteria established under item 8.</p> <p>The monitoring plan will document performance of SIPs during rainfall events compared to current runoff conditions before the project is started. The modeling results from examining land use data, runoff coefficients, and analyzing compliance with water quality standards by using the LID-EZ spreadsheet tool will help to determine degree of compliance with water quality standards.</p>

27. References and Literature Cited

Lumber River Basinwide Assessment, 2010

NC Division of Water Quality, Coastal Development and Shellfish Waters, 1985.

NC Division of Marine Fisheries, Shellfish Sanitation Section data, shoreline surveys

North Carolina Division of Water Quality (NCDWQ). 2007. Stormwater Best Practices Manual. Raleigh, NC.

EPA--Handbook for Developing Watershed Plans to Restore and Protect Our Waters, March 2008.

Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices
Publication Number EPA 841-F-07-006, 2007

Low-Impact Development Design Strategies An Integrated Design Approach, 1999; Prince
Georges County, MC Division of Environmental Resources

Lockwood Folly River TMDL, 2008

Lockwoods Folly TMDL Implementation Plan/Watershed Restoration Plan, 2010

LID EZ spreadsheet prototypes, Withers & Ravenel

NC Coastal Fed 2013 319 Oak Island LF watershed restoration budget

2014

2015 2016 Totals

Staff time

Coastal Scientist	4 weeks	4 weeks	3 weeks	project lead, construction oversight, design and technical assistance
Coastal Advocate	1 weeks	2 weeks	2 weeks	monitoring, technical assistance, community education
Deputy Director	2 weeks	2 weeks	2 weeks	Homeowners Associations community engagement with cooperative extension
Coastal Education Coordinator	2 weeks	4 weeks	2 weeks	community engagement & outreach, education activities
Executive Director	1 week	1 week	2 days	oversight, technical assistance

42,712

Fringe benefits

6,407 15% of salaries--FICA, SEP, etc.

Volunteer match

Adults (in-kind match) 10,459 480 hrs over 3 years, @ 2012 fed. vol. rate \$21.79--monitoring, outreach, SIP installation

10,459

Local Govt match

Town of Oak Island 12,000 stormwater manager's time, construction equipment and personnel

Cash match

NC Coastal Federation 50,000 cash match, private foundation supporting SE restoration work

Contractual

Design, Engineering, Construction 50,000 SIP construction, mobilization, etc.
Modeling 2,500 hydrologic modeling to determine efficacy
Reporting 375 stringers writing stories for the *Coastal Review Online*

52,875

Travel

Project travel 2,000 2,000 2,000 6,000 project travel--state rates and per diem

6,000

Supplies

Project supplies 5,000 revision and printing of DIY Smart Yard citizen guides, smart yard signs, SIP signs (\$120/ea), maps and
Meeting supplies 600 project team meetings, lunches, materials
SIP Tour 500 Event materials; outreach supplies
Community Water Quality Celebration (2) 600 Event materials printing/design; outreach supplies, food, drinks, safety supplies

6,700

Indirect (match)

Indirect (match) 4,912 10% of salary and wages, based on actual costs

114,694 total 319

77,371 total match

192,065 project total (319 +match)



Project I-5: Implementation of a Nine-Element Watershed Restoration Plan in the Dan River Basin

1. Project Title	Implementation of a Nine-Element Watershed Restoration Plan in the Dan River Basin
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2a. Grantee Primary Contact or Project Manager			
Name	Tom Hill		
Title	Community Conservation Assistance Program Coordinator		
Organization Name	NC Division of Soil and Water Conservation		
E-mail address	<u>Thomas.hill@ncagr.gov</u>		
Mailing Address	1614 Mail Service Center		
City	<u>Raleigh</u>	State <u>NC</u>	Zip <u>27699-1614</u>
Telephone	919-715-6107	Fax Number	919-715-6107

2b. Grantee Execution Address (where contract will be mailed for signature)			
Name Title	N. David Smith		
Organization Name	Chief Deputy Director		
E-mail Address	NC Department of Agriculture and Consumer Services		
Mailing Address City	<u>David.smith@ncagr.gov</u>		
Telephone	1001 Mail Service Center		
Federal Tax ID Number	<u>Raleigh</u>	State <u>NC</u>	Zip <u>27699-1001</u>
	919-707-3033	Fax Number	919-715-0026
	56-6000732		

2c. Grantee Payment Address (where invoice payments will be mailed)			
Name Title	Tammy Wall		
Organization Name	Administrative Officer		
E-mail Address	NC Division of Soil and Water Conservation		
Mailing Address City	<u>Tammy.c.wall@ncagr.gov</u>		
Telephone	1614 Mail Service Center		
	<u>Raleigh</u>	State <u>NC</u>	Zip <u>27699-1614</u>
	919-715-6105	Fax Number	919-715-3559

3. Required Statement of Qualifications (to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.)

Please see Appendix A for a listing of the qualifications of those individuals that will be working on this project.

319(h) Grant Funds Requested	\$295,000
Match funds or in-kind Match Services	\$330,486
4. Total Project Cost	\$625,486

5. Project Start Date	1/1/2014	Project End Date	12/31/2016
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**6. Project Location – REQUIREMENT: Important to submit as completely as possible, especially the Lat/Long coordinates and NC Impaired Waters List Assessment Unit Number.
(NOTE: Payment of 319 Invoices will be held if all required information is not submitted in quarterly reports and the final reports, AU numbers, Lat/Long, and coordinates for all installed BMP practices)**

River Basin	Roanoke (Dan River)
Watershed(s)	Dan River
Watershed size	1,693,406 acres
Impaired Waters Listed Stream	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Impaired Waters List Assessment Unit Number	Please see Appendix B for a full listing of 303d and TMDL waters within project scope
HUC(s) (12 digit USGS Hydrologic Unit Codes)	Please see Appendix C for those within project scope
County	Caswell, Rockingham, and Stokes
USGS. 7.5 minute topographic quadrangle map(s) in project area	Please see Appendix D for a map of the project area; the specific USGS quads are not provided due to project extent.
Position coordinates of project location	Latitude Please see Appendix D for a map Longitude Please see Appendix D for a map

7. NPS Pollution Sources to be addressed (Check all that apply)			
X	Agriculture		Waste Disposal (includes onsite systems)
	Construction		Hydrologic Modification
	Silviculture		Marina and Recreational Boating
X	Urban runoff/Stormwater		Groundwater Loading
	Resource Extraction		Natural Sources
X	Habitat Modification (drainage/filling wetlands, streambank destabilization)		Other:

8. NPS Pollutants to be addressed (check all that apply)			
X	Excess Nitrogen		Pesticides
X	Excess Phosphorus		Oil and grease
X	Sedimentation	X	Temperature
X	Pathogens/Bacteria	X	pH
	Metals		Alterations
X	Low dissolved oxygen		Other:

9. Estimate Load Reduction, if checked for excess nitrogen, excess phosphorus and/or sedimentation²	
# pounds of nitrogen saved from project implementation 15,000 lbs	Reference: NLEW
# pounds of phosphorus saved from project implementation 400 lbs	Reference: NLEW
# tons of soil saved from project implementation 8,000 tons	Reference: RUSLE2
Load Reduction Model Used: STEPL, Region 5, L-THIA, Other	

² Providing a load reduction estimate is required for all BMP implementation projects, including demonstrations.

10. Do you intend for collected data to be used by DWQ for Use Support decisions?	
No	Explanation: Due to costs associated with monitoring, we will not be employing standard ambient, benthic, or fish community data collection to be used in Use Support Decisions. Other methods will be used to determine nutrient/sediment reductions and other measureable results.

11. Do you propose to install BMPs or other ag management measures that would be eligible for NC Agricultural Cost Share Program (ACSP) funding? If Yes, please document that the demand for ACSP funding in your county exceeds the supply, prompting your application for a 319(h) grant.

Yes Please see Appendix E for a listing of the NCACSP allocations, encumbrances, and expenditures for each of these counties over the last three years.

No

12. Does this proposal address needs that were identified in a DWQ basin plan? If yes, please identify the specific need and the basin in which the need is outlined.

Explanation: It addresses generally the portions discussed in the 2012 Roanoke Basinwide Plan, pages 1.10 – 1.17 although other sections are addressed as well.

13. Project Abstract (short concise summary of the project – DO NOT EXPAND SPACE PROVIDED)

This project will enhance and complement existing efforts in this watershed to reduce nutrient, sediment, and bacteriological inputs into the Dan River watershed, home of seven rare, threatened, and endangered aquatic species. Two previous EPA 319 grant awards have been made in this watershed and these funds, coupled with other sources including ACSP, CCAP, EQIP, DWR, and potentially others, will result in increased BMP implementation within project scope. During the last 4 years, significant capacity has been built with other agency and NGOs to further discussions, and project implementation, within the Dan River watershed, including across state lines. A project atlas has been developed for this area, one that is flexible and ongoing. Increased attention and understanding by the local farm and private landowner communities has been realized through past BMP and education efforts. This has led to increased participation in programs. This project will continue to further these relationships, the project atlas, and the implementation of BMP projects that will reduce nutrient and fecal coliform inputs into these important waters. Projects will be selected based upon the level of nutrient, sediment, and bacterial inputs that will be reduced by the implementation of the necessary BMPs and their proximity to the most important waters. Additional education and outreach efforts will be made to the general public, agency personnel, and NGOs through increased discussions and tours of ongoing activities by those involved. To date the education efforts have involved local landowners, school groups, agency personnel from DWQ, Natural Heritage, Wildlife Resources Commission, Division of Water Resources, Public Water Supply, the WRIT team, and their counterparts in Virginia. NGOs include the Dan River Basin Association, Piedmont Land Conservancy, Trout Unlimited, and others. While limited discussions have crossed state lines to date, they have been effective in understanding the priorities of each state agency, how they are funded, what funds are currently being expended in the area, and how combined efforts may lead to improved water quality in this watershed. These efforts will be furthered through this grant.

14. Funding Requested										
Budget Categories (itemize all categories)	Section 319				Non-Federal Match *				Total	Justification (Include detailed explanation for each budget line item)
	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4		
Personnel/Salary		\$ 7,600	\$ 15,200	\$ 7,600	\$15,344	\$30,687	\$30,687	\$15,343	\$122,461	Funds for ½ Watershed Coordinator position Stokes County and match from 5 other district personnel
Fringe Benefits		\$ 2,400	\$ 4,800	\$ 2,400	\$3,723	\$7,446	\$7,446	\$3,724	\$31,939	Benefits for the above mentioned
Supplies	\$ 400	\$ 800	\$ 800	\$ 400	\$1,032	\$2,065	\$2,065	\$1,032	\$8,592	Supplies necessary to carry out this program
Equipment	\$ 600	\$ 1,200	\$ 1,200	\$ 600	\$850	\$1,701	\$1,701	\$850	\$8,702	Equipment, including a computer and GIS/gps software
Travel	\$ 500	\$ 1,000	\$ 1,000	\$ 500	\$465	\$930	\$930	\$465	\$5,790	Travel for BMP projects and education and outreach
Contractual	\$ 36,000	\$100,000	\$ 75,000	\$ 35,000	\$15,000	\$30,000	\$30,000	\$15,000	\$336,000	Implementation of BMPs
Other (Landowner contribution)					\$18,667	\$37,333	\$37,333	\$18,667	\$112,000	Landowners' 25% contribution
Total Direct										
Indirect (max. 10% of direct costs, per 40 CFR 35.268)										
Annual Totals	\$37,500	\$113,000	\$ 98,000	\$46,500	\$55,081	\$110,162	\$110,162	\$55,081	\$625,486	
Grand Total	\$295,000				\$330,486				\$625,486	
% of Total Budget	47.2%%				52.8%				100%	

*Note: Non-Federal match must be a minimum of 40% of the total project budget

Year 1: January 1 - June 30, 2014 (6 months) – Total MUST equal sum of quarters 1-2 in Milestone Table #18

Year 2: July 1, 2014-June 30, 2015 (12 months) – Total MUST equal sum of quarters 3-6 in Milestone Table #18

Year 3: July 1, 2015-June 30, 2016 (12 months) – Total MUST equal sum of quarters 7-10 in Milestone Table #18

Year 4: July 1 - December 31, 2016 (6 months) – Total MUST equal sum of quarters 11-12 in Milestone Table #18

15. Budget Summary (Combined federal and match funds)

	BMP Implementation	Project Management	Education Training or Outreach	Monitoring	Technical Assistance	Other	Total
Personnel	\$85,723	\$12,246	\$12,246		\$12,246		\$122,461
Fringe Benefits	\$22,357	\$ 3,194	\$ 3,194		\$ 3,193		\$ 31,938
Supplies	\$ 6,014	\$ 859	\$ 859		\$ 860		\$ 8,592
Equipment	\$ 6,091	\$ 870	\$ 870		\$ 871		\$ 8,702
Travel	\$ 4,053	\$ 579	\$ 579		\$ 579		\$ 5,790
Contractual	\$448,000						\$448,000
Operating Costs							
Other							
Total	\$572,238	\$17,748	\$17,748		\$17,748		\$625,483

16. Local and State Match (non-federal) Summary

Total Match amount	\$330,486
Cash Match	\$112,000
In-kind Match	\$218,446
Source(s) of Cash Match	Out of pocket landowner contribution at 25% of the BMP cost
Source(s) of In-kind Match	Employee salary, district office supplies, equipment, and travel, and Agriculture Cost Share Program funds

17. Project Partners (may add more, if needed)³

Agency Name	Natural Heritage		
Agency Address	Green Square		
Role/contribution to Project	Consulting and identification of endangered and other specie within project area. Technical support		
Contact Person	Judy Ratcliffe	Phone No.	919-707-8628
E-mail address	Judith.ratcliffe@ncdenr.gov		
Agency Name			
Agency Address			
Role/contribution to Project			
Contact Person			
E-mail address			
Agency Name			
Agency Address			
Role/contribution to Project			
Contact Person		Phone No.	
E-mail address			
Agency Name			
Agency Address			
Role/contribution to Project			
Contact Person		Phone No.	
E-mail address			

³ A one-page Statement of Qualifications must be included in Section 3 of the application to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.

18. Project Milestone Schedule

Time Period/Date	Activities (List specific quantifiable outputs or activities that will be achieved during each quarter)	Anticipated % of Requested Funding Spent ¹
First Quarter Jan-Mar 2014	Work with landowners in project area in developing conservation plans and begin implementation of BMPs. Conduct education and outreach to farm community	\$15,000 (5.1% for quarter, 5.1% cumulative)
Second Quarter Apr-June 2014	Conduct meeting with partnership; develop conservation plans and implement BMPs. Conduct site visits on potential heritage sites	\$22,500 (7.6% for quarter 12.7% cumulative)
Third Quarter July-Sept 2014	Develop conservation plans and implement BMPs. Educate local county staffs on the developments of the meetings held last quarter. Meet with schools on education activities	\$25,000 (8.5% for quarter 21.2% cumulative)
Fourth Quarter Oct-Dec 2014	Develop conservation plans and implement BMPs. Meet with partnership.	\$35,000 (11.9% for quarter 33.1% cumulative)
Fifth Quarter Jan-Mar 2015	Discussion with farmers/landowners with those that expressed interest in the first set of contacts but did not sign up. Develop plans and implement BMPs (off season)	\$20,000 (6.8% for quarter 39.9% cumulative)
Sixth Quarter Apr-Jun 2015	Develop conservation plans and implement BMPs. Conduct meeting with partnership.	\$33,000 (11.2% for quarter 51.1% cumulative)
Seventh Quarter July-Sept 2015	Develop conservation plans and implement BMPs. Continue discussion with landowners on BMPs and other land stewardship activities. Meet with schools on education activities.	\$20,000 (6.8% for quarter 57.9% cumulative)
Eighth Quarter Oct-Dec 2015	Develop conservation plans and implement BMPs (heavy season).	\$45,000 (15.3% for quarter 73.2% cumulative)
Ninth Quarter Jan-Mar 2016	Meet with conservation partnership. Develop conservation plans and implement BMPs	\$15,000 (5.1% for quarter 78.3% cumulative)
Tenth Quarter Apr-June 2016	Meet with local county staffs on project and conservation partnership activities. Develop conservation plans and implement BMPs	\$18,000 (6.1% for quarter 84.4% cumulative)
Eleventh Quarter ² July-Sept 2016	Work with partnership on Final Report. Develop the last conservation plans and implement BMPs.	\$16,520 (5.6% for quarter, 90% cumulative)
Twelfth Quarter Oct-Dec 2016	Implement the final BMPs for this project and write the Final Report.	\$29,500 final quarter payment 100%

¹ Please show anticipated dollar amount, percent of grant spent that quarter, and cumulative percent of grant spent for project. Quarterly invoices will only be reimbursed up to percent indicated. Unused funds will carry forward to next quarter.

² 10% of grant will be held until receipt of Final Project Report

Note: Sum of funds spent in quarters 1-2 MUST equal year 1 total in Budget Table #14
Sum of funds spent in quarters 3-6 MUST equal year 2 total in Budget Table #14
Sum of funds spent in quarters 7-10 MUST equal year 3 total in Budget Table #14
Sum of funds spent in quarters 11-12 MUST equal year 4 total (min. 10% of 319 funds)

19. Background and goals of the project. Expand space, if necessary.

Two previous EPA 319 awards have been made in this watershed. Both implemented significant BMPs and furthered conservation efforts in the watershed. Through 319 funds a watershed coordinator position was placed in the Stokes district. This position is currently funded at 50% by Stokes County and 50% from grant funds. This increased capacity has not only led to increased conservation planning efforts and BMP implementation, but to increased cooperation between the district and the county. Additionally it has allowed cooperation between other conservation organizations and the districts within the project scope. The increased dollars have led to the implementation of an additional 90 or so BMPs in this watershed. The funds have also led to increased interest in conservation activities by landowners in the area. More farmers are requesting assistance and have become aware of not only the 319 and other cost share programs, but of conservation efforts across the watershed. The project has led to "spin-offs" including the acquisition of two significant buffers by the Stokes district and a collaborative stream restoration project feasibility study funded by DWR. It has also led to some monitoring by the Winston Salem Regional Office staff and Wildlife Resources Commission staff. These projects have led to increased cooperation with the Dan River Basin Association, Piedmont Land Conservancy, Natural Heritage, and their counterparts in Virginia along with the local districts. The increased momentum gained in this watershed will only be furthered by additional funding. The goals include the reduction of the following: 15,000 lbs of nitrogen, 400 lbs of phosphorus, 8,000 tons of soil loss reductions affecting over 1,000 acres. Additional goals include meeting with the conservation partnership at least 3 times and further other conservation goals.

20. A detailed description of the project. Expand space, if necessary.

This project will continue and build upon the work completed in previous awards. A project atlas has been formed (please see attached maps in the Appendices) which will allow the districts to begin discussions with the landowners that have expressed interest in the past but did not commit due to a lack of funds for their project. The districts will develop a comprehensive conservation plan for each property where BMP implementation will take place. Each participant will be encouraged to further all resource concerns on the property including forestry and wildlife practices. The conservation plan will address the resource concerns identified by individual site visits. After development of the plan, the BMPs will be implemented. Landowners will also be educated on activities in the Dan River watershed, such as the extent of the rare, threatened and endangered species in the watershed, the recreational activities, and other aspects of conservation in the area. Other conservation partnership organizations, such as Natural Heritage, Wildlife Resources Commission, NC Forest Service, the Dan River Basin Association, and the Piedmont Land Conservancy (among others) will be asked to provide technical information on their programs that can be shared with willing landowners. Those landowners that express interest in furthering those types of resource enhancements will be introduced to those organizations that fit their interests and needs. Through this project the initial discussions that have taken place across state lines will be furthered as well. We will have at least three additional meetings with the conservation partnership groups in Virginia. The BMP project atlas will be a flexible and continuous document, being updated as additional projects are recognized. Other funding sources will be examined for increased conservation efforts. The Dan River Watershed Restoration Plan for Agricultural Non-point Sources of Pollution will be used as a guide in developing a systematic approach, working in partnerships, to forward conservation efforts in the watershed.

21. Monitoring/Environmental Data Collection. Describe in the section below how project data will be used (i.e. demonstrate effectiveness of BMPs installed, calculate load reductions, data to be used for State use support purposes, etc.). If monitoring is needed to document the water quality improvement from a project, a Quality Assurance Project Plan (QAPP) will be required (reviewed and approved by DWQ). For a QAPP template, visit the 319 Program website at <http://portal.ncdenr.org/web/wq/ps/nps/319program/applyfor319>

We will do streambank erosion determinations, BEHI, and the DWQ assessment form on projects involving streambank stabilization. Before and after photographs will be used to document activities and progress made with the installation of BMPs. Special studies may well be undertaken, similar to those that are taking place currently under the second award, including monitoring by the Winston Salem Regional office, specie counts undertaken by Wildlife Resources Commission, and possible specie identification by Natural Heritage.

22. Public Involvement

The farmers and other private landowners will be deeply involved in the project as will school children in the three participating districts. During the last award, hundreds of school children were introduced and educated on various water quality issues in their areas and what efforts are being undertaken to improve these resources. Additionally, local county staffs will be involved not only from a budgetary standpoint, but also in connecting similar resource concerns. As an example, during the last award, Stokes County Planning Department conducted a study of the recreational opportunities with the Dan River and how it aligned with activities at Hanging Rock and Pilot Mountain. The local district was provided input to the report and a copy is used as reference. It should be noted that the Stokes District has acquired two conservation easements during these awards. Other spin-off projects include a stream restoration feasibility study funded through DWR. These districts are building additional capacity in getting more conservation on the ground through public involvement activities that are ongoing.

23. List Project Outputs and Products (All 319 funded projects are required to submit Quarterly Progress Reports and a detailed Final Project Report, due by the end of the contract for DWQ review and approval.)

15,000 lbs of nitrogen
400 lbs of phosphorus
8,000 tons of soil loss reductions
1,000 acres affected
Meetings with conservation partnership organizations
2 meetings with the Virginia counterparts

24. Projects Developing or Implementing a Watershed Restoration Plan must include EPA's 9 Key Elements for Watershed Restoration Plans. Draft Plans must be submitted to DWQ for review and approval at least *60 days before* end of the project/contract period (use additional pages if necessary).

1	An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed
2	A description of the NPS management measures that will need to be implemented to achieve load reductions as well as to achieve other watershed goals identified in the watershed based plan
3	An estimate of the load reductions expected for the management measures
4	An estimate of the amount of technical and financial assistance needed associated costs and or sources and authorities that will be relied upon, to implement the plan
5	An information/education component that will be used to enhance public understanding of the project
6	A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious
7	A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented
8	A set of criteria that can be used to determine whether loading reductions are being achieved overtime and substantial progress is being made towards attaining water quality standards
9	A monitoring component to evaluate the effectiveness of the implementation efforts over time measured against the criteria established under item 8.

Appendix A – Statement of Qualifications for Participants in the Dan River Project

Mitch Thompson is a District Technician with the Caswell Soil and Water Conservation District, having been employed

Kevin Moore is a District Watershed Conservationist and Director of the Rockingham Soil and Water Conservation District. Kevin has been with the District for

Jason Byrd is a District Technician with the Rockingham Soil and Water Conservation District and has been employed
MPs.

Tom Smith is a District Soil/Watershed Conservationist with the Stokes Soil and Water Conservation District and

Rodney Wright is the Watershed Coordinator for the existing Dan River 319 Watershed Project housed with the Stokes District. Rodney has held this position for approximately

Janice Pack is the District Administrative/Education Specialist in Stokes County and has over of experience in budgeting, report writing, and other administrative duties.

Jill Malton is with the NC Natural Resources Conservation Service and is a licensed Professional Engineer. Jill has experience in engineering designs

Daphne Cartner is with the NC Division of Soil and Water Conservation and has over experience in engineering designs for agriculture and urban practices.

Tom Hill is the Non-Point Source Coordinator for the NC Division of Soil and Water Conservation and has been with the Division for approximately
Division.

25. References and Literature Cited

Dan River Watershed Restoration Plan for Agricultural Non-point Sources of Pollution
Roanoke Basinwide Plan (May 2012)

Appendix F – Photos of Potential Projects



Rockingham County - Cattle damage
at the Bank of the Dan River



David Martin Stokes County



Site for stream restoration in
Caswell County at Rattlesnake Creek



Rockingham County
Farm needs water tanks, well and fencing.

Appendix E
Allocations, Encumbrances, and Expended Funds 2011 - 2013

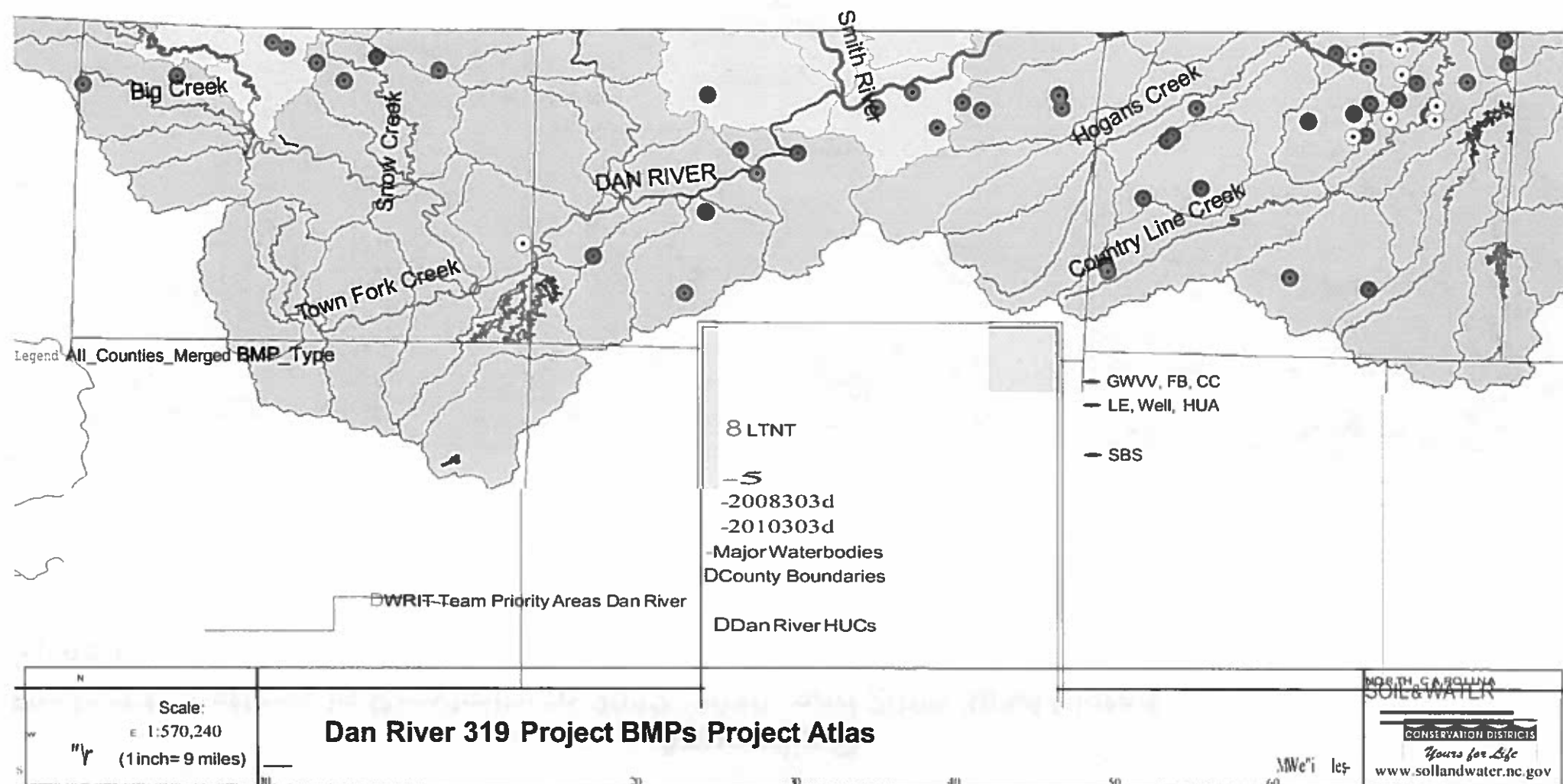
Year	County	Total County Funds	Encumbrance	% Encumbered	Expended	% Expended
2013	CASWELL -	\$54,416	\$54,196	99.6%	\$46,105	84.7%
2013	ROCKINGHAM	\$50,054	\$45,585	91.1%	\$14,615	29.2%
2013	STOKES	\$38,621	\$38,619	100.0%	\$2,101	5.4%
* 2012	CASWELL -	\$155,964	\$155,964	100.0%	\$101,741	65.2%
* 2012	ROCKINGHAM	\$149,722	\$145,668	97.3%	\$78,242	52.3%
* 2012	STOKES	\$89,043	\$87,168	97.9%	\$50,185	56.4%
2011	CASWELL -	\$58,681	\$58,681	100.0%	\$55,162	94.0%
2011	ROCKINGHAM	\$93,769	\$93,769	100.0%	\$82,963	88.5%
2011	STOKES	\$57,909	\$57,909	100.0%	\$51,721	89.3%
	Totals	\$748,179	\$737,559	98.6%	\$482,835	64.5%

* Note: this year had considerable Drought Appropriation Funds allocated to districts

Please note that these figures include EPA 319 funds, most of which were allocated in 2012 fiscal year

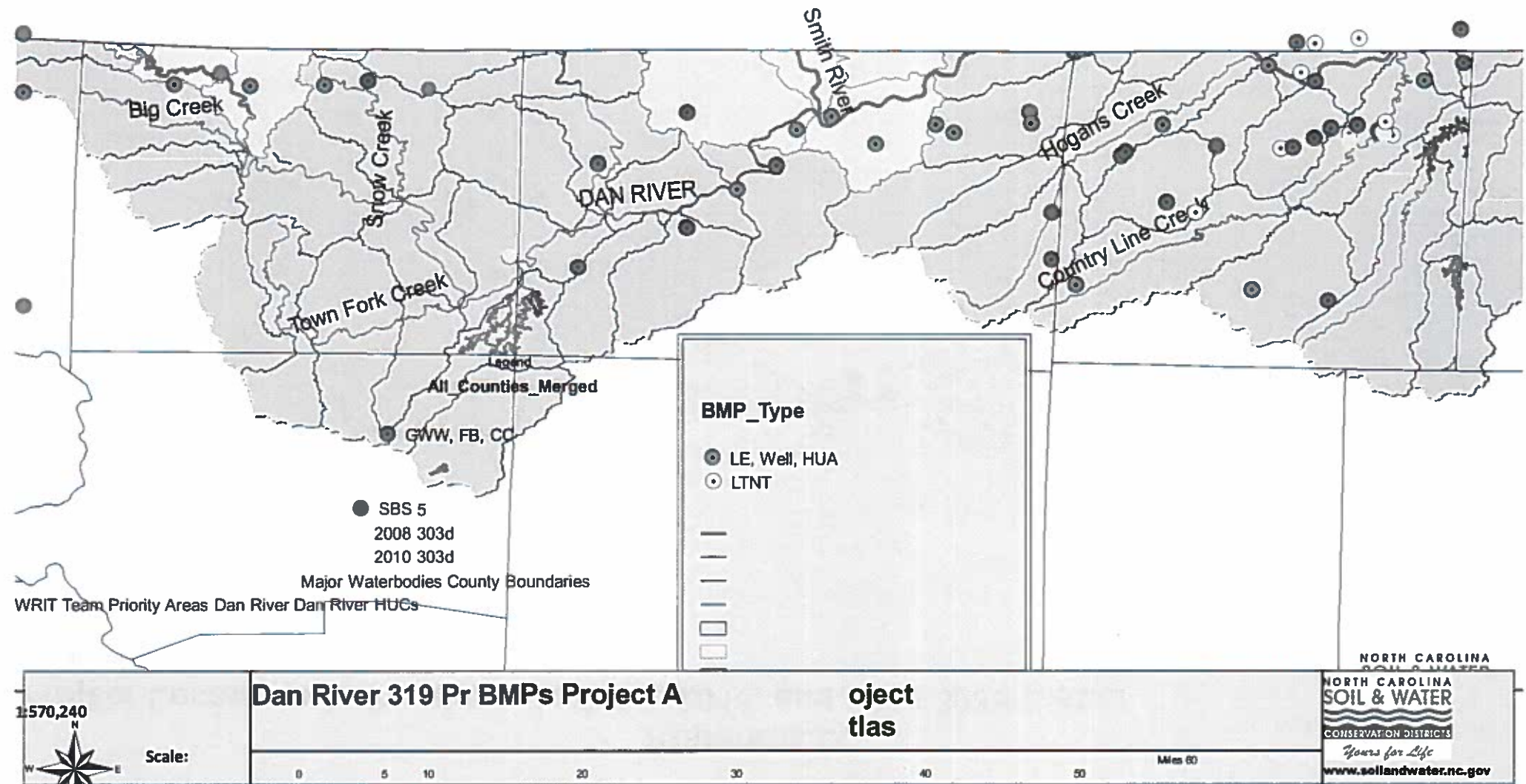
Appendix D

Project Locations in Proximity to 2012, 2010, and 2008 303d Listed Streams



Appendix D

Project Locations in Proximity to 2012, 2010, and 2008 303d Listed Streams



Appendix C - 12 Digit Hydrologic Units within the Dan River Watershed Project Area

030101030905	25,982	Lower Wolf Island Creek	3,097	1.13360	294.5
030101030906	12,177	Danville-Dan River	47	2.57145	33.2
030101040102	18,325	Pumpkin Creek-Dan River	774	1.04382	44.6
030101040103	12,928	Lick Fork	2,967	2.85799	369.1
030101040104	29,155	Upper Hogans Creek	5,241	1.13661	331.2
030101040105	24,769	Lower Hogans Creek	2,385	0.62139	150.2
030101040106	20,233	Upper Moon Creek	1,908	0.41235	83.4
030101040107	11,306	Lower Moon Creek	1,356	0.65659	74.3
030101040108	15,662	Rattlesnake Creek	2,482	1.25233	196.2
030101040109	25,015	Cane Creek-Dan River	529	0.27897	29.5
030101040201	28,426	South Country Line Creek	1,652	0.45106	128.2
030101040202	35,469	Upper Country Line Creek	2,728	0.53827	190.8
030101040203	24,818	Lower Country Line Creek	1,783	0.41262	101.2
030101040302	33,599	Double Creek-Dan River	308	0.39067	11.5
030101040303	16,199	Winns Creek	222	0.33263	11.3
030101040501	10,257	Reedy Fork	430	0.61278	62.9
030101040502	36,344	Hyco Creek	2,031	0.58312	211.9
030101040503	18,570	Upper South Hyco Creek	686	0.68604	127.3
030101040504	17,530	Middle South Hyco Creek	1,092	0.41347	72.4
030101040506	13,216	Hyco Creek-Hyco Lake	897	0.37578	49.7
030101040507	14,189	Cane Creek-Hyco Lake	952	1.31698	186.3
030300020202	22,016	Upper Troublesome Creek	3,730	1.26922	279.1
030300020203	13,721	Lower Troublesome Creek	3,540	2.17866	298.7
030300020205	8,327	Little Troublesome Creek	8,112	11.46562	953.0
030300020206	10,524	Giles Creek-Haw River	1,736	0.75887	79.8
030300020207	13,017	Town of Altamahaw-Haw River	1,873	0.97725	127.2
030300020401	29,837	Stony Creek-Lake Burlington	2,790	0.66240	197.5
030300020402	16,781	Jordan Creek	1,808	0.90336	151.5
030401010902	24,602	Toms Creek	4,849	1.36535	335.7
030401011003	10,990	West Prong Little Yadkin River	2,133	0.53756	59.1
030401011004	9,358	East Prong Little Yadkin River	1,939	0.48830	45.6
030401011005	18,870	Little Yadkin River	9,865	2.55047	481.2
030401011302	22,398	Headwaters Muddy Creek	15,324	3.81362	853.9

Appendix C - 12 Digit Hydrologic Units within the Dan River Watershed Project Area

12 Digit Hydrologic Unit	Acres	Hydrologic Unit Name	Population	Percent Impervious	Impervious Surface Acres
030101030102	24,659	Archies Creek-Dan River	492	0.35668	21.9
030101030103	20,611	Little Dan River	31	1.35130	5.9
030101030104	12,423	Elk Creek-Dan River	441	0.32260	23.3
030101030105	26,180	Peters Creek-Dan River	897	0.35294	52.1
030101030106	28,634	Big Creek	2,279	0.39187	112.2
030101030107	8,464	Double Creek	845	0.36618	31.0
030101030108	11,166	Vade Macum Creek	666	0.31834	35.5
030101030109	28,244	Flat Shoals Creek-Dan River	2,002	0.33384	94.3
030101030201	17,753	Headwaters Town Fork Creek	4,494	0.56308	99.9
030101030202	22,483	Neatman Creek-Upper Town Fork Creek	6,069	0.84343	189.6
030101030203	31,923	Town of Walnut Cove-Middle Town Fork Creek	7,325	1.26705	404.4
030101030204	14,349	Lick Creek-Lower Town Fork Creek	3,394	0.87090	125.0
030101030301	28,004	Snow Creek	2,361	0.34117	95.6
030101030302	17,072	Town Fork Creek-Dan River	2,098	0.37300	63.7
030101030304	20,905	Belews Lake	4,249	0.85467	178.7
030101030305	24,780	Beaver Island Creek	4,362	1.06122	263.0
030101030306	25,839	Reed Creek-Dan River	4,574	1.08292	279.9
030101030402	16,547	Russell Creek	71	0.69870	7.0
030101030404	25,425	Crooked Creek-Lower South Mayo River	599	0.28568	29.1
030101030407	33,906	Koger Creek-North Mayo River	0	0.00000	0.0
030101030408	19,924	Pawpaw Creek-Mayo River	931	0.31165	53.6
030101030409	18,831	Town of Mayodan-Mayo River	6,202	2.62751	494.9
030101030501	15,641	Hogan Creek	3,668	1.22969	192.3
030101030502	24,027	Jacobs Creek	2,718	0.66011	158.5
030101030503	17,462	Massy Creek-Dan River	2,292	1.25628	219.4
030101030504	26,960	Rock House Creek-Dan River	3,552	0.99794	269.0
030101030505	35,679	Matrimony Creek-Dan River	13,299	2.45680	736.0
030101030802	19,199	Marrowbone Creek	7	2.67809	1.4
030101030807	31,400	Fall Creek-Smith River	7,460	10.23217	688.1
030101030901	22,544	Town Creek-Dan River	6,044	2.58960	583.9
030101030902	27,012	Cascade Creek	1,993	6.69192	408.0
030101030903	27,785	Trotters Creek-Dan River	752	0.40949	39.7
030101030904	18,156	Upper Wolf Island Creek	7,979	4.01924	729.0

Appendix B - Listing of 303D and TMDL Waters Within the Dan River Watershed 1998 - 2010

22-58-12-6	Marlowe Creek	Source to Storys Creek	10.9 Miles	
23-(31.5)	Dan River	0.7 mile upstream to a point 0.8 mile ds of	14.2 Miles	
Totals			33.1 Miles	3750.0

2002

22-(31.5)	DAN RIVER	0.7 mile upstream to a point 0.8 mile ds of	25.9 Miles	
22-25a	Town Fork Creek	From source to Timmons Cr.	8.0 Miles	
22-58-(0.5)	Hyco River, including Hyco	From source in Hyco Lake to dam, including trib below elevation 410		3750.0
22-58-12-6	Marlowe Creek	Source to Storys Creek	10.9 Miles	
Totals			44.8 Miles	3750.0

2000

22-58-12-6	Marlowe Creek	Source to Storys Creek	2.7 Miles	
22-58-(0.5)	Hyco River, including Hyco	From source in Hyco Lake to dam, including trib below elevation 410		3750.0
22-Belews Lake	Belews Lake			4030.0
Totals			2.7 Miles	7780.0

1998

22-58-12-6	Marlowe Creek	Source to Storys Creek	2.7 Miles	
22-58-(0.5)	Hyco River, including Hyco	From source in Hyco Lake to dam, including trib below elevation 410		3750.0
22-Belews Lake	Belews Lake			4030.0
Totals			2.7 Miles	7780.0

Appendix B - Listing of 303D and TMDL Waters Within the Dan River Watershed 1998 - 2010

Assessment Unit Number	Assessment Unit Name	Assessment Unit Description	Assessment Unit Length	Units	Assessment Unit Size
2010					
22-(1)b	DAN RIVER	From Little Dan River to Peters Creek	11.6	Miles	
Totals			11.6	Miles	

2008					
22-(1)b	DAN RIVER	From Little Dan River to Peters Creek	11.6	FW Miles	
22-(31.5)a	DAN RIVER	From a point 0.7 mile upstream of Jacobs	4.8	FW Miles	
22-(31.5)b	DAN RIVER	From 03-02-02 boundary to a point 0.8 mile	9.4	FW Miles	
22-(38.5)	DAN RIVER	Mill Branch (Town of Eden water supply int	0.6	FW Miles	
22-(39)a	DAN RIVER	From Mill Branch to NC/VA crossing downst	13.8	FW Miles	
22-(39)b	DAN RIVER	From NC/VA crossing downstream of Wolf I	9.6	FW Miles	
22-14-1	Newman Branch	From source to Buck Island Creek	1.3	FW Miles	
22-27-10	Arm of Belews Lake	Entire Arm	326.5	FW Acres	
22-30-(1)	Mayo River	From North Carolina-Virginia State Line dow	3.5	FW Miles	
22-58-(0.5)	Hyco River, including Hyco	From source in Hyco Lake to dam, including			4297.9
Totals			381.1	Miles	4297.9

2006					
22-(31.5)	DAN RIVER	0.7 mile upstream to a point 0.8 mile ds of	9.0	Miles	
22-14-1	Newman Branch	From source to Buck Island Creek	0.5	Miles	
22-25a	Town Fork Creek	From source to Timmons Cr.	8.0	Miles	
22-27-10	Arm of Belews Lake	Entire Arm	3.1	Miles	
22-40-(1)	Smith River	From NC-VA Line to 0.8 mile ds of Rockingh a	2.8	Miles	
22-40-(2.5)	Smith River	From 0.8 mile ds Rockingham County SR 17	0.5	Miles	
22-40-(3)	Smith River	From Fieldcrest Mills Water Supply Intake to	1.8	Miles	
22-58-(0.5)	Hyco River, including Hyco	From source in Hyco Lake to dam, including trib below elevation 410			3750.0
22-58-12-6	Marlowe Creek	Source to Storys Creek	10.9	Miles	
Totals			36.6	Miles	3750.0

2004

22-25a	Town Fork Creek	Source to Timmons Creek	8.0	FW Miles	
22-58-(0.5)	Hyco River, including Hyco	From source in Hyco Lake to dam, including trib below elevation 410			3750.0



David Martin Farm in Stokes County that needs water tanks, fencing and a well



Area along the Dan River that needs water tanks well and fencing to keep cattle out of the Dan River



Area near the Dan River that needs to transition from conventional row crops to no-till farming



Farm in Stokes County that needs 200 acres no-till and 200 acres of cover crop.



Caswell County – Under the bridge beside the Dan River



Stream stabilization project in Rockingham County

Year	President	Party	Term
1789	George Washington	None	1789-1797
1797	John Adams	Federalist	1797-1801
1801	Thomas Jefferson	Democratic-Republican	1801-1809
1809	James Madison	Democratic-Republican	1809-1817
1817	James Monroe	Democratic-Republican	1817-1825
1825	John Quincy Adams	Democratic-Republican	1825-1829
1829	Andrew Jackson	Democratic	1829-1837
1837	Martin Van Buren	Democratic	1837-1841
1841	William Henry Harrison	Whig	1841-1845
1845	John Tyler	Whig	1845-1849
1849	Franklin Pierce	Democratic	1849-1853
1853	Franklin Pierce	Democratic	1853-1857
1857	James Buchanan	Democratic	1857-1861
1861	Abraham Lincoln	Republican	1861-1865
1865	Andrew Johnson	Unionist	1865-1869
1869	Ulysses S. Grant	Republican	1869-1877
1877	Rutherford B. Hayes	Republican	1877-1881
1881	James A. Garfield	Republican	1881-1885
1885	Chester A. Arthur	Republican	1885-1893
1893	Grover Cleveland	Democratic	1893-1897
1897	William McKinley	Republican	1897-1901
1901	Theodore Roosevelt	Republican	1901-1909
1909	William Howard Taft	Republican	1909-1913
1913	Woodrow Wilson	Democratic	1913-1921
1921	Warren G. Harding	Republican	1921-1923
1923	Calvin Coolidge	Republican	1923-1933
1933	Franklin D. Roosevelt	Democratic	1933-1945
1945	Dwight D. Eisenhower	Republican	1945-1961
1961	John F. Kennedy	Democratic	1961-1963
1963	Lyndon B. Johnson	Democratic	1963-1969
1969	Richard M. Nixon	Republican	1969-1974
1974	Gerald R. Ford	Republican	1974-1977
1977	Jimmy Carter	Democratic	1977-1981
1981	Ronald Reagan	Republican	1981-1989
1989	George H. W. Bush	Republican	1989-1993
1993	Bill Clinton	Democratic	1993-2001
2001	George W. Bush	Republican	2001-2009
2009	Barack Obama	Democratic	2009-2017
2017	Donald Trump	Republican	2017-2021
2021	Joe Biden	Democratic	2021-Present

Appendix G - Budget Justification Part 2

Staff	Percentage of Time, Total (3 yrs)	Salary	Benefits	Supplies	Equipment	Travel	Staff	Total Salary	Total Benefits	Total Supplies	Total Equipment	Total Travel
Staff	50.0%	\$ 37,368	\$ 10,046	\$ 2,684	\$ 1,200	\$1,200	Staff	\$ 18,684	\$ 5,023	\$ 1,342	\$ 600	\$ 600
Staff	50.0%	\$ 57,696	\$ 8,181	\$ 2,400	\$ 1,750	\$1,200	Staff	\$ 28,848	\$ 4,091	\$ 1,200	\$ 875	\$ 600
Staff	50.0%	\$ 33,279	\$ 9,508	\$ 2,000	\$ 1,500	\$1,200	Staff	\$ 16,640	\$ 4,754	\$ 1,000	\$ 750	\$ 600
Staff	50.0%	\$ 49,895	\$ 14,821	\$ 2,400	\$ 4,000	\$1,500	Staff	\$ 24,948	\$ 7,411	\$ 1,200	\$ 2,000	\$ 750
Staff	10.0%	\$ 29,422	\$ 10,612	\$ 1,800	\$ 1,000	\$1,200	Staff	\$ 2,942	\$ 1,061	\$ 180	\$ 100	\$ 120
				\$ 11,284	\$ 9,450	\$6,300						
								\$ 92,061	\$ 22,339	\$ 4,922	\$ 4,325	\$ 2,670

NC Agriculture Cost Share Program allocates approximately \$50,000 to each of these counties each year (please see the spreadsheet on encumbered and expended funds for each district over the last 3 years). We will be using a conservative sum of \$10,000 for each of the participating districts over the 3 year contract period for a total of \$90,000 match over the life of the contract. Landowner contribution for these ACSP funds will equal $\$90,000 / 0.75 = \$90,000$.

*Landowner provides 25% of construction as out of pocket expense for these grant funds. Total

Landowner contribution = $\$82,000$ ($246,000 / 0.75 = \$246,000$)

Total In-Kind Contributions:

District Salaries	\$ 92,061	
District Benefits	\$ 22,339	
District Supplies	\$	6,194
District Equipment	\$	5,102
District Travel	\$	2,790
NCACSP BMP Funds	\$ 90,000	
NCACSP Landowner BMP Funds	\$ 30,000	
Landowner Contribution	\$ 82,000	
Total In-Kind Contributions	\$ 330,486	

Note: dollar figure above is rounded due to the equation

Project I-6: Implementing and Evaluating Stormwater BMPs in Durham

1. Project Title	Implementing and Evaluating Stormwater BMPs in Durham
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2a. Grantee Primary Contact or Project Manager¹			
Name	Daniel E. Line		
Title	Extension Specialist		
Organization Name	NCSU Biological And Agricultural Engineering		
E-mail address	dan_line@ncsu.edu		
Mailing Address	Box 7637		
City	Raleigh	State	NC Zip 27695-7637
Telephone	919-515-8243	Fax Number	919-515-6772

¹ A one-page Statement of Qualifications must be provided in Section 3 of the application form to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.

2b. Grantee Execution Address (where contract will be mailed for signature)			
Name	Matthew Ronning		
Title	Associate Vice Chancellor, Research Administration		
Organization Name	North Carolina State University		
E-mail Address	SPS@ncsu.edu		
Mailing Address	Box 7514 (Fed Ex: 2701 Sullivan Drive, Suite 240)		
City	Raleigh	State	NC Zip 27695-7514
Telephone	919-515-2444	Fax Number	919-515-7721
Federal Tax ID Number	56-6000-756		

2c. Grantee Payment Address (where invoice payments will be mailed)			
Name	Julie Ann Brasfield Schwindt		
Title	Director, Office of Contracts and Grants		
Organization Name	North Carolina State University		
E-mail Address	julie_brasfield@ncsu.edu		
Mailing Address	Administrative Services III 251, Box 7214		
City	Raleigh	State	NC Zip 27695-7214
Telephone	919-515-8008	Fax Number	919-515-4693

3. Required Statement of Qualifications (to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.)

The following project team members have extensive experience with design, installation, maintenance, and monitoring of best management practices, including BMPs for construction site erosion and sediment control, urban stormwater, agricultural and forestry runoff, and stream and wetland restoration:

Dan Line, PE, Extension Specialist, Bio. & Ag. Engineering Dept.

William F. Hunt, III, PE, Assoc. Professor and Extension Specialist, Bio. & Ag. Engineering Dept.

Ryan Winston, PE, Extension Associate, Bio. & Ag. Engineering Dept.

Current and Recent Past 319-Funded Projects for project team:

1. Robeson Creek Watershed Restoration 2007-2010
2. Level Spreader- Vegetated Filter Strip Demonstration and Evaluation in Chatham County. 2010.
3. Revising the Tar-Pamlico BMP Selection Worksheets for Jordan Lake and Conducting Field Surveys to Assess Bioretention Design, Construction, and Maintenance. 2009.
4. Demonstration and Evaluation of Floating Wetland Islands. 2009.
5. Watershed Retrofit and Management Evaluation for Urban Stormwater Management Systems in North Carolina, Including Projected Costs and Benefits. 2008.
6. Demonstrating and Evaluating Low Impact Development Techniques. 2009.
7. Demonstration & Monitoring of Rainwater Harvesting/ Cistern Technology in NC. 2008.
8. Putting LID on the 'Big Box': Integrating LID Technology on a Commercial Site. 2007.
9. NPS Pollution Control Implementation for Water Quality. 2005.
10. Stormwater Wetlands in Asheville. 2004-2007.
11. Asheville Low Impact Development (LID) & Stormwater BMP Demonstrations. 2004-2007.
12. Designing BMPs to Comply with Phase II Stormwater Regulations. 2003-2005.
13. Bent Creek Stream Restoration and Stormwater Best Management Practices. 2003-2006.
14. Sediment Removal Demonstration and Evaluation for Mountain Streams. 2003-2004.
15. Robeson Creek Watershed Assessment and TMDL Implementation Plan. 2002-2006.
16. Upper Neuse Urban Watersheds. 1997-2000.
17. Coastal Urban and Recreation BMP Demonstration Project. 1996-1999.
18. Long Creek National Monitoring Project. 1996-2001.

319(h) Grant Funds Requested	\$64,052			
Match funds or in-kind Match Services	\$45,823	5. Type of Project (check one)		Development or implementation of a Watershed Restoration Plan
				Development or implementation of a TMDL
4. Total Project Cost	\$109,875		x	Other: Installation of BMPs per recommendations of TMDL and Watershed Plan

6. Project Start Date	January 1, 2014	Project End Date	December 31, 2016
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7. Geographic Coverage	Statewide	Regional	Watershed x	Site Specific
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8. Project Location – REQUIREMENT: Important to submit as completely as possible, especially the Lat/Long coordinates and NC Impaired Waters List Assessment Unit Number. (NOTE: Payment of 319 Invoices will be held if all required information is not submitted in quarterly reports and the final reports, AU numbers, Lat/Long, and coordinates for all installed BMP practices)	
River Basin	Cape Fear
Watershed(s)	Third Fork Creek
Watershed size	10,268 acres; area to wetland ~8 ac.
Impaired Waters Listed Stream	Yes X No
Impaired Waters List Assessment Unit Number	16-41-1-12-(1),16-41-1-12-(2)
HUC(s) (12 digit USGS Hydrologic Unit Codes)	030300020602
County	Durham
USGS. 7.5 minute topographic quadrangle map(s) in project area	Southwest Durham Quadrangle
Position coordinates of project location	Latitude 35 55' 15.4" Longitude 78 57' 7.38"

9. NPS Pollution Sources to be addressed (Check all that apply)

	Agriculture		Waste Disposal (includes onsite systems)
	Construction		Hydrologic Modification
	Silviculture		Marina and Recreational Boating
x	Urban runoff/Stormwater		Groundwater Loading
	Resource Extraction		Natural Sources
	Habitat Modification (drainage/filling wetlands, streambank destabilization)		Other:

10. NPS Pollutants to be addressed (check all that apply)

x	Excess Nitrogen		Pesticides
x	Excess Phosphorus		Oil and grease
X	Sedimentation		Temperature
	Pathogens/Bacteria		pH
x	Metals		Alterations
	Low dissolved oxygen		Other:

11. Estimate Load Reduction, if checked for excess nitrogen, excess phosphorus and/or sedimentation²

# pounds of nitrogen saved from project implementation 80.6 lb/yr	Reference: Line et al. (2002) and Line et al. (2008)
# pounds of phosphorus saved from project implementation 10.1 lb/yr	Reference: Line et al. (2002) and Line et al. (2008)
# tons of soil saved from project implementation 1 ton/yr	Reference: Line et al. (2002) and Line et al. (2008)
Load Reduction Model Used: STEPL, Region 5, L-THIA, Other	

² Providing a load reduction estimate is required for all BMP implementation projects, including demonstrations.

12. Do you intend for collected data to be used by DWQ for Use Support decisions?

no	Explanation: monitoring is for BMP effectiveness
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11. Do you propose to install BMPs or other ag management measures that would be eligible for NC Agricultural Cost Share Program (ACSP) funding? If Yes, please document that the demand for ACSP funding in your county exceeds the supply, prompting your application for a 319(h) grant.	
Yes	No x

12. Does this proposal address needs that were identified in a DWQ basin plan? If yes, please identify the specific need and the basin in which the need is outlined.	
x	Explanation: Stormwater from the site drains to Third Fork Creek which eventually drains to Jordan Lake. Reduction of nitrogen and phosphorus loading in Third Fork Creek and Jordan Lake are priority needs identified by DWQ.

13. Project Abstract (short concise summary of the project – DO NOT EXPAND SPACE PROVIDED)	
<p>The NC State University Biological and Agricultural Engineering Dept. proposes to install stormwater runoff BMP's in the Woodcroft HOA soccer fields located in south Durham. The Woodcroft HOA is in the process of adopting the guidelines of the Durham County Voluntary Nutrient Reduction Program for management of their soccer fields on the site and has agreed to fund part of the installation cost for the BMPs. The stormwater BMPs would replace a concrete-lined channel with a vegetated swale and the downstream wet area with probably a stormwater wetland. The BMPs have not been decided yet but the swale and wetland are the obvious choices. In any event, surface water inflow to and outflow from the BMP combination will be monitored continuously via automated samplers. Groundwater inflow appears to be minimal and thus will not be monitored. Nitrogen (TKN, NH₃-N, NO_x-N), phosphorus (TP), and total suspended solids (TSS) loads will be computed and used as the measure of the reduction efficiency. Statistical analysis will be conducted to determine whether the reductions are significant with respect to unexplainable/natural variability. Construction cost data will be maintained and used to compute a cost-effectiveness of the stormwater wetland. Monitoring data from this project will be used to help calibrate the Jordan Lake Stormwater Load Accounting Tool. A guided tour/workshop for the area residents will be offered and educational signage will be installed on-site for self-guided tours of the BMPs. Results will be presented at statewide and likely national meetings/conferences along with publication in a scientific journal.</p>	

4. Funding Requested										
Budget Categories (itemize all categories)	Section 319				Non-Federal Match *				Total	Justification (Include detailed explanation for each budget line item)
	Year1	Year2	Year3	Year4	Yr 1	Yr 2	Yr 3	Yr 4		
Personnel/Salary	5472	17527	7696	6585					37280	D. Line (5%), R. Winston(14.5%), & biweekly student time to implement the project
Fringe Benefits	1641	5013	1820	1731					10205	Staff benefits
Supplies	316	1266	1266	316					3164	Monitoring supplies & gas for dept. vehicle
Current services	349	1396	1396	349					3490	lab analysis, sampler repair, signage
Travel	-	45	36	9					90	Mileage for motor fleet vehicle
Contractual	0	4000	0	0	0	40000	0	0	44000	BMP installation& signage
Other					778	2925	1221	899	5823	Under-Recovered Indirects (Full Indirects-charged)
Total Direct	7778	29247	12214	8990						
Indirect (max. 10% of direct costs, per 40 CFR 35.268)	778	2925	1221	899					5823	
Annual Totals	8556	32172	13435	9889	778	42925	1221	899		
Grand Total	64052				45823				109875	
% of Total Budget	58.30%				41.70%				100%	
*Note: Non-Federal match must be a minimum of 40% of the total project budget										

Year 1: January 1 - June 30, 2014 (6 months) – Total MUST equal sum of quarters 1-2 in Milestone Table #18

Year 2: July 1, 2014-June 30, 2015 (12 months) – Total MUST equal sum of quarters 3-6 in Milestone Table #18

Year 3: July 1, 2015-June 30, 2016 (12 months) – Total MUST equal sum of quarters 7-10 in Milestone Table #18

Year 4: July 1 - December 31, 2016 (6 months) – Total MUST equal sum of quarters 11-12 in Milestone Table #18

15. Budget Summary (Combined federal and match funds)							
	BMP Implementation	Project Management	Education Training or Outreach	Monitoring	Technical Assistance	Other	Total
Personnel	24232	2982	1864	7456	746		37280
Fringe Benefits	6633	816	510	2041	205		10205
Supplies	633		0	2531			3164
Equipment							
Travel	39			51			90
Contractual	44000						44000
Current Services	0		698	2792			3490
Under-recovered Indirects	3553	380	307	1487	95		5823
Operating Costs	3553	380	307	1487	95		5823
Other							
Total	82644	4558	3686	17845	1141		109875

16. Local and State Match (non-federal) Summary	
Total Match amount	\$45,823
Cash Match	\$37,500
In-kind Match	\$8,323
Source(s) of Cash Match	Woodcroft HOA for BMP design and installation (\$37,500)
Source(s) of In-kind Match	Woodcroft HOA land and personnel costs (\$2500). NCSU under-recovered indirect costs (\$5823)

17. Project Partners (may add more, if needed)³			
Agency Name	Woodcroft Home Owners Association		
Agency Address	5501 Fortunes Ridge Drive, Suite D; Durham, NC 27713		
Role/contribution to Project	Landowner		
Contact Person	Ruth Bowman, Business Manager	Phone No.	919-493-1552
E-mail address	ruth@woodcroftonline.com		
Agency Name	Durham Soil and Water Conservation District		
Agency Address	721 Foster Street; Durham, NC 27701		
Role/contribution to Project	Landowner outreach, local program/regulation		
Contact Person	Michael Dupree	Phone No.	919-560-0558
E-mail address	mdupree@dconc.gov		

³ A one-page Statement of Qualifications must be included in Section 3 of the application to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.

18. Project Milestone Schedule		
Time Period/Date	Activities (List specific quantifiable outputs or activities that will be achieved during each quarter)	Anticipated % of Requested Funding Spent¹
First Quarter Jan-Mar 2014	Survey site and begin wetland and swale design; submit quarterly report	4278(6.68, 6.68%)
Second Quarter Apr-June 2014	Complete design and begin construction; submit quarterly report	4278(6.68, 13.36%)
Third Quarter July-Sept 2014	Complete construction; submit quarterly report	8043(12.56, 25.91%)
Fourth Quarter Oct-Dec 2014	Install monitoring stations and begin monitoring; install educational signage; submit quarterly report	8043(12.56, 38.47%)
Fifth Quarter Jan-Mar 2015	Continue monitoring; submit quarterly report	8043(12.56, 51.03%)
Sixth Quarter Apr-Jun 2015	Continue monitoring; submit quarterly report	8043(12.56, 63.59%)
Seventh Quarter July-Sept 2015	Continue monitoring; submit quarterly report	3359(5.24, 68.83%)
Eighth Quarter Oct-Dec 2015	Continue monitoring; submit quarterly report; conduct tour/workshop	3359(5.24, 74.07%)
Ninth Quarter Jan-Mar 2016	Continue monitoring; submit quarterly report	3359(5.24, 79.32%)
Tenth Quarter Apr-June 2016	Continue monitoring; submit quarterly report	3358(5.24, 84.56%)
Eleventh Quarter ² July-Sept 2016	Continue monitoring; submit quarterly report	2967(4.63, 89.19%)
Twelfth Quarter Oct-Dec 2016	Write and submit final report and manuscript for publication	6922(10.81, 100%)

¹ Please show anticipated dollar amount, percent of grant spent that quarter, and cumulative percent of grant spent for project. Quarterly invoices will only be reimbursed up to percent indicated. Unused funds will carry forward to next quarter.

² 10% of grant will be held until receipt of Final Project Report

19. Background and goals of the project. Expand space, if necessary.

Municipalities and other entities in the Jordan Lake watershed need ways to reduce nitrogen and phosphorus loading to the lake to meet state requirements. The Durham Soil & Water Conservation District alone has been implementing BMP's with the CCAP program in Durham since its inception. Since 2008, DSWCD has cost shared 76 BMP's totaling \$114,436.00 with Durham landowners. This program has been very successful and has generated interest and demand, so much so that there are not sufficient funds to address the water quality problems observed by DSWCD staff on field visits. The question that always arises is 'How effective are the implemented BMPs at reducing nitrogen and phosphorus loading to the lake?' In these economic times cost-effectiveness data is an ever increasing need.

This proposed project is designed to provide cost-effectiveness data for a common stormwater BMP: a stormwater wetland. The stormwater wetland would be implemented to treat runoff from about an 8-acre area that includes parking lots, tennis courts, a clubhouse, and soccer fields. The runoff leaves the site and flows directly into Third Fork Creek, which is impaired, eventually flowing into Jordan Lake. The Woodcroft Homeowners Association (HOA) has agreed to donate land and funds for a combined grass swale and stormwater wetland to treat runoff from the site. The wetland would be designed to have a surface area of 70-80% of the typical design guidelines. Because the wetland is undersized, it will provide an excellent data point for determination of the performance of smaller practices. Rainfall and inflow and outflow from the wetland will be monitored continuously via automated samplers to provide the loads data to determine reduction efficiencies for nitrogen, phosphorus, and sediment. Efficiency data for undersized practices are especially necessary because in many urban areas space for stormwater retrofits is limited or very expensive. Also, this wetland will provide another data set from which to calibrate the Jordan Lake Stormwater Load Accounting Tool (JLSLAT).

20. A detailed description of the project. Expand space, if necessary.

The purpose of this project is to design, construct, and monitor the effectiveness of a stormwater wetland for treating runoff from about (drainage area estimated from map) an 8-acre area in south Durham encompassing parking lots, a clubhouse, tennis courts, soccer fields, and other open space. The wetland will be constructed in a wet stormwater drainageway between soccer fields (see photo below). The residents of the Woodcroft neighborhood have already agreed to provide the land for the wetland and in fact have offered to fund much of the cost (see letter at end of proposal). The residents are also excited about the educational opportunity as many school-aged children come to the area to play soccer on the adjoining fields.

The wetland will be built with typical deep pool, shallow water, and shallow land features. Wetland plants that are suited for each habitat will be planted, and an outlet structure will be used to retain water at appropriate depths. This wetland will be designed to have a surface area that is 70-80% of the typical design, meaning that it will be designed for the 0.7-0.8 inch storm event. Monitoring (described later) will be utilized to determine pollutant concentration, hydrologic parameters, and pollutant loads entering and leaving the wetland. Because the wetland is undersized, it will provide an excellent data point for determination of the performance of smaller practices. These types of practices are necessary in situations where space is limited for stormwater retrofits, which are being required by Jordan and Falls Lake Rules. Also, this wetland will provide another data set from which to calibrate the JLSLAT. The JLSLAT has a provision for undersized BMPs, but very little data is available to characterize load reduction efficiencies for such BMPs.

Monitoring of inflow and outflow as described in section 21 below will provide data on the water quality effectiveness/efficiency of the wetland. In addition, cost of construction and maintenance will be compiled and used to compute a cost-effectiveness of the wetland. Wetlands are typically relatively low maintenance; however, some maintenance may be required. The landscape staff of the Woodcroft HOA has already been briefed about the proposed wetland and will be trained on maintenance procedures during the project. At least one tour of the wetland for area residents will be conducted and possibly a workshop on stormwater and stormwater BMPs will be offered.



Figure 1. Aerial view of proposed location of stormwater wetland.

21. Monitoring/Environmental Data Collection. Describe in the section below how project data will be used (i.e. demonstrate effectiveness of BMPs installed, calculate load reductions, data to be used for State use support purposes, etc.). If monitoring is needed to document the water quality improvement from a project, a Quality Assurance Project Plan (QAPP) will be required (reviewed and approved by DWQ). For a QAPP template, visit the 319 Program website at <http://portal.ncdenr.org/web/wq/ps/nps/319program/applyfor319>

In order to document the effectiveness of the stormwater wetland, the inflow to and outflow from wetland will be monitored continuously for 2 years following the completion of the wetland. Rainfall will be measured using an 8-inch diameter tipping-bucket rain gauge, while flow monitoring devices such as weirs and or flumes will be used in conjunction with automated samplers to measure flow. Flow-proportional samples of inflow and outflow from each storm will be collected by the samplers. The pacing between samples will be set such that to adequately characterize the entire storm event hydrograph for storms up to at least 1.5 inches. Individual samples collected by the machine will remain in either glass or plastic containers in the samplers until being recovered by project personnel. Samples will be retrieved as soon as possible after the event; however, the recovery of samples is likely to be delayed to allow for sufficient drawdown of the wetland. Thus, odd-numbered sampler bottles will be pre-acidified to immediately reduce the pH of the sample to <2 for preservation of nitrogen (TKN, $\text{NH}_3\text{-N}$, $\text{NO}_x\text{-N}$) and phosphorus (TP) species. Duplicate samples will be put in unpreserved, even-numbered bottles for analysis of TSS. Past research has shown that concentrations of TSS in surface water samples does not change significantly within up to 14 days of sitting in sampler bottles at ambient temperatures; however, samples will likely be retrieved within 72 hrs. Because copper (Cu) has been indicated as contributing to the impairment of Third Fork Creek, at least some initial samples will be analyzed for metals (Cu, Pb, Zn). However, if levels are low (near Reportable Limit), this analysis will be discontinued. At retrieval, equal-volume aliquots of individual samples will be combined into a composite sample and transferred to appropriate laboratory-supplied containers. Samples will then be transported to a state-certified laboratory for analysis. A chain-of-custody form will accompany the sample from the time of recovery from the sampler through laboratory analysis to track its handling. Maximum holding times will not exceed those recommended by Standard Methods.

A QAPP will be developed and followed during the project. The QAPP will be submitted to DWQ for approval within the first 2 months of the project so that it can be approved prior to the start of monitoring.

Flow and concentration data will be combined to compute inflow and outflow loads in order to thoroughly assess the effectiveness/efficiency of the wetland. Rainfall data will be used to assess how representative of long-term conditions the project period was and to assess the effectiveness of periods with design storms or smaller versus periods with greater than design storms. The location of the wetland is subject to flooding from Third Fork Creek, so effectiveness data from large storms may be limited. Statistical analyses will be conducted to evaluate whether differences in loads are significant.

22. Public Involvement

The Woodcroft HOA has agreed to participate in Durham's Voluntary Nutrient Reduction Program their soccer fields on the site. Durham County Soil and Water Department is working to educate and encourage homeowners to reduce fertilizer applications to their property by 40%. The program encourages homeowners to follow fertilizer application BMPs when applying fertilizer to their lawn or garden. The BMP's recommended by the Voluntary Nutrient Reduction Program include soil sampling, recommended lime and fertilizer application rate and timing, sweeping misplaced fertilizer, and use of low input vegetation.

The Woodcroft HOA is interested in participating in educational opportunities presented by the wetland such as developing and making signs for the wetland and helping with a tour of the wetland. The wetland will provide an excellent demonstration of a stormwater wetland for residents of the community and Durham County in general. In addition, the adjacent soccer fields are used by numerous families with school-aged children, thereby serving as an educational opportunity for numerous people of all ages.

The NC State University BAE Dept. maintains an active extension and outreach program on stormwater and stormwater BMPs. This site will likely be used in this program as well as possibly being used in classroom instruction. Results also will likely be presented to state and national conferences.

23. List Project Outputs and Products (All 319 funded projects are required to submit Quarterly Progress Reports and a detailed Final Project Report, due by the end of the contract for DWQ review and approval.)

The following are the outputs:

1. Construct a stormwater wetland on the Woodcroft HOA site
2. Monitor rainfall, inflow, and outflow to document the water quality effectiveness of the wetland
3. Conduct at least 1 guided tour/workshop
4. Install educational displays/signage at the wetland
5. Write and submit for publication a manuscript on the results of the project
6. Write submit quarterly reports
7. Write and submit final report

24. Projects Developing or Implementing a Watershed Restoration Plan must include EPA's 9 Key Elements for Watershed Restoration Plans. Draft Plans must be submitted to DWQ for review and approval at least *60 days before* end of the project/contract period (use additional pages if necessary).

1	An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed
2	A description of the NPS management measures that will need to be implemented to achieve load reductions as well as to achieve other watershed goals identified in the watershed based plan
3	An estimate of the load reductions expected for the management measures
4	An estimate of the amount of technical and financial assistance needed associated costs and or sources and authorities that will be relied upon, to implement the plan
5	An information/education component that will be used to enhance public understanding of the project
6	A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious
7	A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented
8	A set of criteria that can be used to determine whether loading reductions are being achieved overtime and substantial progress is being made towards attaining water quality standards
9	A monitoring component to evaluate the effectiveness of the implementation efforts over time measured against the criteria established under item 8.

A watershed management plan for Third Fork Creek has been submitted by the City of Durham and has been reviewed by DWQ. The review (dated April, 2013) stated that the plan "generally meets the requirements associated with the Nine Element Watershed Plan as specified by EPA.". The plan puts a high priority on the need for stormwater BMP retrofits such as stormwater wetlands.

25. References and Literature Cited

- Line, D.E., G.D. Jennings, M.B. Shaffer, J. Calabria, W.F. Hunt. 2008. Evaluating the Effectiveness of Two Stormwater Wetlands in North Carolina. *TRANS of the ASABE* 51(2):1-8.
- Line, D.E., N.M. White, D.L. Osmond, G.D. Jennings, and C.B. Mojonnier. 2002. Pollutant Export from Various Land Uses in the Upper Neuse River Basin. *Water Environment Research* 74(1):100-108.

WOODCROFT COMMUNITY ASSOCIATION

5501 FORTUNES RIDGE DRIVE • SUITE D • DURHAM, NC 27713
919-493-1551

May 21, 2013

Mr. Daniel E. Line
Extension Specialist
North Carolina State University
Biological and Agricultural Engineering Department
Box 7625
Raleigh, NC 27695

Dear Mr. Line,

The Woodcroft Community Association (WCA) is pleased to participate in the 319 project entitled "Demonstrating and Evaluating Stormwater BMPs in the Woodcroft Community" that is being proposed by the Piedmont Conservation Council and the NCSU Biological and Agricultural Engineering Department. The WCA Board of Directors has agreed to contribute up to \$37,500.00 toward the project in addition to the use of the land on which the BMP will be located. The WCA participation may also include logistical support, hosting a tour of the BMP, and possibly a neighborhood workshop on water quality issues such as stormwater BMPs. The total value of the contribution from the WCA is expected to be \$40,000.00.

Sincerely,



Wendy Sotolongo
President, Woodcroft Board of Directors





CITY OF DURHAM
Department of Public Works
Stormwater Services
101 City Hall Plaza | Durham, NC 27701
919.560.4326 | F 919.560.4318

www.durhamnc.gov

August 12, 2013

Mr. Daniel E. Line
Extension Specialist
North Carolina State University
Biological and Agricultural Engineering Department
Box 7625
Raleigh, NC 27695

Dear Mr. Line:

The City of Durham is pleased to provide this letter of support to the NCSU Biological and Agricultural Engineering Department for the 319 project entitled "Implementing and Evaluating Stormwater BMPs in the Woodcroft Community." The project will implement and monitor a slightly undersized stormwater wetland.

We request that that pre-project estimates of nutrient reduction be performed using the Jordan-Falls Nutrient Accounting Tool for comparison to measured performance.

We support implementing and evaluating this stormwater wetland, both for the reduction in nutrients and the advancement in understanding of how to retrofit existing development areas.

Sincerely,

John H. Cox
Water Quality Manager

c: Sandra Wilbur, Civil Engineer III
Lance Fontaine, Ph.D., Water Quality Analyst

Durham – Where Great Things Happen

Project I-7: Implementation of the Regenerative Stormwater Conveyance Technology to Stabilize an Erosional Gully

1. Project Title	Implementation of the Regenerative Stormwater Conveyance Technology to Stabilize an Erosional Gully in Durham, NC
-------------------------	---

2a. Grantee Primary Contact or Project Manager¹			
Name	William F. Hunt		
Title	Professor and Extension Specialist		
Organization Name	North Carolina State University		
E-mail address	wfhunt@ncsu.edu		
Mailing Address	Campus Box 7625		
City	Raleigh	State	NC Zip 27695
Telephone	919-515-6751	Fax Number	919-515-6772

¹A one-page Statement of Qualifications must be provided in Section 3 of the application form to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.

2b. Grantee Execution Address (where contract will be mailed for signature)			
Name	Matt Ronning		
A	Associate Vice Chancellor		
Organization Name	North Carolina State University		
E-mail Address	sps@ncsu.edu		
Mailing Address	2701 Sullivan Drive, Admin Services III, CB 7514		
City	Raleigh	State	NC Zip 27695-7514
Telephone	919-515-2444	Fax Number	919-515-7721
Federal Tax ID Number	56-6000-756		

2c. Grantee Payment Address (where invoice payments will be mailed)			
Name	Dollie Moore		
Title	Director of College Research Administration		
Organization Name	CALs Contracts and Grants		
E-mail Address	Dollie_moore@ncsu.edu		
Mailing Address	Patterson Hall 18, Box 7644		
City	Raleigh	State	NC Zip 27695-
Telephone	919-515-6226	Fax Number	919-513-3493

entire practice to ecological restoration, conservation planning and regenerative design. Acknowledging the degree of overlap in these core services, the firm's team includes engineers, ecologists, biologists, soil scientists, natural resource planners, geomorphologists, landscape architects and planners.

Biohabitats has experience designing and constructing regenerative stormwater conveyances (RSC's) since their inception in the Chesapeake Bay region, several years ago. We helped Keith Underwood, whose idea originally sparked the creation of the first regenerative stormwater conveyance, develop and refine his original design on several projects over that time period. Together, Underwood and Associates and Biohabitats have designed and built more RSC's than anyone.

319(h) Grant Funds Requested	\$132,854
Match funds or in-kind Match Services	\$94,992
4. Total Project Cost	\$227,846

5. Project Start Date	01/01/2014	Project End Date	6/30/2016
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6. Project Location – REQUIREMENT: Important to submit as completely as possible, especially the Lat/Long coordinates and NC Impaired Waters List Assessment Unit Number. (NOTE: Payment of 319 Invoices will be held if all required information is not submitted in quarterly reports and the final reports, AU numbers, Lat/Long, and coordinates for all installed BMP practices)	
River Basin	Cape Fear River Basin
Watershed(s)	Third Fork Creek
Watershed size	10624 acres
Impaired Waters Listed Stream	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Impaired Waters List Assessment Unit Number	Third Fork Creek: 16-41-1-12(1), 16-41-1-12(2); Jordan Lake: 16-(37.3), 16-(37.5)a, 16-(37.5)b, 16-41-(0.5), 16-41-(3.5)a, 16-41-1-(14), 16-41-2-(9.5)
HUC(s) (12 digit USGS Hydrologic Unit Codes)	030300020602
County	Durham
USGS. 7.5 minute topographic quadrangle map(s) in project area	Southwest Durham
Position coordinates of project location	Latitude 35.955181N Longitude 78.928211W

REDACTED

Exemption 6 Personal Privacy

3. Required Statement of Qualifications (to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.)

William F. Hunt, III, Ph.D., PE,

[Redacted text block for William F. Hunt, III, Ph.D., PE]

Ryan Winston, M.S., P.E.

[Redacted text block for Ryan Winston, M.S., P.E.]

7. NPS Pollution Sources to be addressed (Check all that apply)			
	Agriculture		Waste Disposal (includes onsite systems)
	Construction		Hydrologic Modification
	Silviculture		Marina and Recreational Boating
X	Urban runoff/Stormwater		Groundwater Loading
	Resource Extraction		Natural Sources
X	Habitat Modification (drainage/filling wetlands, streambank destabilization)		Other:

8. NPS Pollutants to be addressed (check all that apply)			
X	Excess Nitrogen		Pesticides
X	Excess Phosphorus	X	Oil and grease
X	Sedimentation		Temperature
X	Pathogens/Bacteria		pH
X	Metals		Alterations
	Low dissolved oxygen		Other:

9. Estimate Load Reduction, if checked for excess nitrogen, excess phosphorus and/or sedimentation ²	
# pounds of nitrogen saved from project implementation: 19.33 lbs	Reference: Jordan Lake Nutrient Accounting Tool
# pounds of phosphorus saved from project implementation: 14.23 lbs	Reference: Jordan Lake Nutrient Accounting Tool
# tons of soil saved from project implementation: 25 tons	Reference: Bank Erosion Hazard Index, Rosgen (2001)
Load Reduction Model Used: See above references.	

² Providing a load reduction estimate is required for all BMP implementation projects, including demonstrations.

10. Do you intend for collected data to be used by DWQ for Use Support decisions?	
X	Explanation: No.

11. Do you propose to install BMPs or other ag management measures that would be eligible for NC Agricultural Cost Share Program (ACSP) funding? If Yes, please document that the demand for ACSP funding in your county exceeds the supply, prompting your application for a 319(h) grant.	
Yes	No X

12. Does this proposal address needs that were identified in a DWQ basin plan? If yes, please identify the specific need and the basin in which the need is outlined.

Yes	<p>Explanation: In the 2005 Cape Fear River Basinwide Water Quality Plan, the reach of Third Fork Creek immediately downstream of the project site (16-41-1-12-(2)) is listed as exceeding turbidity standards by 12.2%. Other stressors listed include low dissolved oxygen (MS4, NPDES) and fecal coliform bacteria (MS4, NPDES). A TMDL was approved in January 2005 for total suspended solids and recommends a reduction in TSS from the Durham stormwater system. Subsequent to the Cape Fear Basinwide Plan, a chlorophyll-a TMDL for B. Everett Jordan Lake was approved in 2007 which addresses total nitrogen and total phosphorus from Third Fork Creek. The Basin Plan recommends continued monitoring of water quality in Third Fork creek and additional efforts to reduce the impacts from the Durham stormwater system. Implementation of this project, a naturalized, enlarged sand filter-analog device, will stabilize a section of highly eroding channel, reducing sediment loading, which will in turn reduce downstream total suspended solids and turbidity, an identified stressor. This project will measure load reductions for TSS, N, P and select metals. Additionally, as stated in the NCDENR Stormwater Manual, Chapter 11, page 11-3, sand filters are "effective in removing urban stormwater pollutants including TSS, BOD, fecal coliform, hydrocarbons and metals." This project will not measure the BOD, fecal coliform or hydrocarbon parameters, but it is assumed, based on previous research and the Manual, that an un-quantified amount water quality benefit for those pollutants will be gained with the proposed RSC. Thus, this project will provide stabilization and improvement of the water quality stressors identified in the Basinwide Plan.</p>
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13. Project Abstract (short concise summary of the project – DO NOT EXPAND SPACE PROVIDED)

The proposed project is a regenerative stormwater conveyance (RSC) stormwater BMP device, to be installed on an unnamed tributary to Third Creek, located just upstream of Martin Luther King Parkway, in Southern Boundaries City Park, adjacent to the Durham Public Works Operations facility, on Third Fork Road in Durham, NC. The RSC design will fill the existing incised ephemeral stormwater channel with a mixture of sand and mulch, control grade with a combination of parabolic boulder weir and cascade structures and stabilize the existing eroding channel banks. Additionally, water quality will be improved by the sand filtration device through reductions in biological oxygen demand, pathogens/bacteria, nitrogen loading, phosphorus loading, heavy metal loading and oil and grease loading. The site was modeled using the Jordan Lake Nutrient Loading Accounting Tool. The estimated drainage area used was 8.867 ac, with a 36.1% impervious area. A sand filter was the closest analog in the model for the RSC. The estimated total amount of nitrogen captured per year from the site 19.33 lbs and the estimated total amount of phosphorus captured per year is 14.28 lbs. In addition, The RSC will desynchronize high stormwater flows and promote groundwater infiltration.

This SCM will be monitored for 12 months to determine performance of the RSC system. Pollutant loading reduction will be calculated from monitored data for TN, TP, TSS, and select heavy metals. Information gleaned from the monitoring will be disseminated to the engineering and design community. A factsheet will be produced that details the performance, design, construction, and maintenance of these SCMs. Results from this study may allow designers another option when attempting to meet stringent load reduction requirements, such as the Jordan and Falls Lake Rules.

14. Funding Requested								
Budget Categories (itemize all categories)	Section 319			Non-Federal Match *			Total	Justification (Include detailed explanation for each budget line item)
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3		
Personnel/Salary	\$0	\$0	\$0	\$23,120	\$23,120	\$12,621	\$58,861	Salary for monitoring for Winston, Kennedy, and Graduate Student
Fringe Benefits	\$0	\$0	\$0	\$3,493	\$3,493	\$1,932	\$8,918	Fringe benefits for Winston & Kennedy
Supplies	\$1,000	\$3,000	\$0	\$21	\$0	\$0	\$4,021	Supplies for constructing weirs, other monitoring supplies
Equipment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	Sampling equipment will be reused from other projects
Travel	\$1,200	\$400	\$200	\$0	\$0	\$0	\$1,800	Travel to/from site for meetings, construction oversight, and monitoring
Contractual	\$5,745	\$62,374	\$26,541	\$0	\$0	\$0	\$94,660	Contract for design & installation of RSC
Other	\$3,500	\$11,562	\$5,253	\$17,164	\$2,326	\$922	\$40,727	Graduate Student Tuition
Total Direct	\$11,445	\$77,336	\$31,994	\$43,798	\$28,939	\$15,475	\$208,987	
Indirect (max. 10% of direct costs, per 40 CFR 35.268)	\$1,145	\$7,734	\$3,200	\$2,663	\$2,661	\$1,456	\$18,859	
Annual Totals	\$12,590	\$85,070	\$35,194	\$46,461	\$31,600	\$16,931	\$227,846	
Grand Total	\$132,854			\$94,992			\$227,846	
% of Total Budget	58.3%			41.7%			100%	

*Note: Non-Federal match must be a minimum of 40% of the total project budget

Year 1: January 1 - June 30, 2014 (6 months) – Total MUST equal sum of quarters 1-2 in Milestone Table #18

Year 2: July 1, 2014-June 30, 2015 (12 months) – Total MUST equal sum of quarters 3-6 in Milestone Table #18

Year 3: July 1, 2015-June 30, 2016 (12 months) – Total MUST equal sum of quarters 7-10 in Milestone Table #18

15. Budget Summary (Combined federal and match funds)							
	BMP Implementation	Project Management	Education Training or Outreach	Monitoring	Technical Assistance	Other	Total
Personnel	5000	3000	3000	47861	0	0	58,861
Fringe Benefits	758	455	455	7250	0	0	8,918
Supplies	0	0	0	4021	0	0	4,021
Equipment	0	0	0	0	0	0	0
Travel	400	0	0	1400	0	0	1,800
Contractual	94660	0	0	0	0	0	94,660
Operating Costs	0	0	0	0	0	0	0
Other	0	0	0	40727	0	18859	59,586
Total	100818	3455	3455	101259	0	18859	227,846

16. Local and State Match (non-federal) Summary	
Total Match amount	\$94,992
Cash Match	\$60,000
In-kind Match	\$34,992
Source(s) of Cash Match	City of Durham will fund a cash match of \$60,000.
Source(s) of In-kind Match	2% match for Dr. Bill Hunt's time over 2.5 years. Forfeited overhead of 16.9% of requested \$134,660 in EPA 319 funds.

17. Project Partners (may add more, if needed)³			
Agency Name	City of Durham – Public Works Department, Stormwater and GIS Services Division		
Agency Address	101 City Hall Plaza, Durham, NC 27701		
Role/contribution to Project	\$60,000 cash match and use of land for installation and monitoring of device		
Contact Person	Lance Fontaine, PhD and Sandra Wilbur, PE	Phone No.	919-560-4326
E-mail address	Lance.Fontaine@DurhamNC.Gov and Sandra.Wilbur@DurhamNC.Gov		
Agency Name	Biohabitats, Inc		
Agency Address	8218 Creedmoor Road, Suite 201, Raleigh, NC 27613		
Role/contribution to Project	Design of RSC stormwater BMP, construction oversight		
Contact Person	Kevin Nunnery	Phone No.	919-518-0311
E-mail address	knunnery@biohabitats.com		
Agency Name	North State Environmental, Inc		
Agency Address	2889 Lowery St, Winston-Salem, NC 27101		
Role/contribution to Project	Construction contractor		
Contact Person	Darrell Westmoreland	Phone No.	(336) 725-9915
E-mail address	darrell@nsenv.com		

³ A one-page Statement of Qualifications must be included in Section 3 of the application to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.

18. Project Milestone Schedule		
Time Period/Date	Activities (List specific quantifiable outputs or activities that will be achieved during each quarter)	Anticipated % of Requested Funding Spent¹
First Quarter Jan-Mar 2014	Survey RSC installation site, develop conceptual plan for review with City of Durham and contractor	\$5,590 (4.2%) 4.2% of total budget
Second Quarter Apr-June 2014	Develop full-scale engineering plans. Meet with project partners to discuss design details.	\$7,000 (5.3%) 9.5% of total budget
Third Quarter July-Sept 2014	Complete engineering plans (100% design). Develop construction documents for design-build project. Design monitoring scheme for site.	\$7,000 (5.3%) 14.8% of total budget
Fourth Quarter Oct-Dec 2014	Construct and plant the RSC. Install monitoring equipment and begin monitoring.	\$65,000 (48.9%) 63.7% of total budget
Fifth Quarter Jan-Mar 2015	Continue monitoring. Collect samples for 4-5 storm events and collect hydrologic data for all storms.	\$6,535 (4.9%) 68.6% of total budget
Sixth Quarter Apr-Jun 2015	Continue monitoring. Collect samples for 4-5 storm events and collect hydrologic data for all storms.	\$6,535 (4.9%) 63.5% of total budget
Seventh Quarter July-Sept 2015	Continue monitoring. Collect samples for 4-5 storm events and collect hydrologic data for all storms	\$6,535 (4.9%) 78.4% of total budget
Eighth Quarter Oct-Dec 2015	Complete monitoring. A total of 16-20 storm events will have been collected.	\$6,535 (4.9%) 83.3% of total budget
Ninth Quarter Jan-Mar 2016	Analyze data, begin writing final report. Begin to compose workshop series on RSC design, construction, maintenance, and performance.	\$8,840 (6.7%) 90.0% of total budget
Tenth Quarter ² Apr-June 2016	Finalize data analysis and final report. Give a pair of workshops on RSC design, construction, maintenance, and performance for design professionals in North Carolina.	\$13,284 (10%) 100% of total budget

¹ Please show anticipated dollar amount, percent of grant spent that quarter, and cumulative percent of grant spent for project. Quarterly invoices will only be reimbursed up to percent indicated. Unused funds will carry forward to next quarter.

² 10% of grant will be held until receipt of Final Project Report

Note: Sum of funds spent in quarters 1-2 MUST equal year 1 total in Budget Table #14
Sum of funds spent in quarters 3-6 MUST equal year 2 total in Budget Table #14
Sum of funds spent in quarters 7-10 MUST equal year 3 total in Budget Table #14

19. Background and goals of the project. Expand space, if necessary.

Third Fork Creek and its watershed have been identified as impaired in the 303(d) process. The NC Division of Water Quality (DWQ) has determined that Third Fork Creek is not meeting state water quality standards due to high turbidity (muddy water), low dissolved oxygen (impacting the fish and other life in the stream that require oxygen to survive), and poor biological conditions (habitat and health of fish and other aquatic organisms). A Total Maximum Daily Load (TMDL) for turbidity for a segment of Third Fork Creek was approved in 2005. The pollutant reductions for this TMDL are expressed as pounds per year of total suspended solids (TSS). Additionally, DWQ findings indicate that pollution from the Upper New Hope Creek basin which includes Third Fork Creek is contributing to poor water quality in Jordan Lake. A chlorophyll-a TMDL for Jordan Lake was approved in 2007 which addresses nitrogen and phosphorus from Third Fork Creek. Third Fork Creek is subject to the Jordan Lake Nutrient Management Strategy which requires reductions in the nitrogen and phosphorus being discharged to Jordan Lake.

The proposed RSC site is located on City of Durham property which lies between the Public Works Operations Center (PWOC) and Southern Boundaries City park. The City's December 2012 Watershed Management Plan for Third Fork Creek identified City-owned land and specifically the PWOC as a suitable location to implement various stormwater control measures. A Regenerative Stormwater Conveyance device is consistent with this recommendation as this project is intended to reduce a substantial source of sediment to Third Fork Creek through stabilization of a deeply incised channel with actively eroding banks. Additionally, the RSC sand media will reduce nitrogen, phosphorus, sediment, and heavy metal concentrations and loads from the impervious parking lot areas of Southern Boundaries City Park.

20. A detailed description of the project. Expand space, if necessary.

The location of the project is as described in Section 13, on City of Durham property. The RSC will be installed in a section of ephemeral stormwater channel that is approximately 75 feet in length. There is an approximate seven to eight-foot headcut located at the upstream end of the project reach. The channel downstream from this point averages approximately 15 feet in width from top of bank to top of bank and is incised, on average, approximately 4-5 feet. At the downstream end of the reach there is another headcut, approximately 4-5 feet in elevation. The RSC will end just upstream of the location of this existing downstream headcut.

In a RSC, water conveyance and processing is accomplished via a constructed network of sand seepage berms, pools, and boulder (or cobble, depending on the modeled flow) weirs. The arrangement of these features raises the incised invert of the incised channel back to pre-disturbance elevation and forms a new surface topography that controls the surface and subsurface hydrology. The modifications necessary to establish the sand seepage hydrology result in the creation of a series of vegetated stilling pools, sand seepage beds replete with above and below-ground biomass, and associated flow paths through the sand/mulch filter media. The physical effect of the pools and the vegetation planted on the lateral sides of the channel in the sand media reduce water velocity and facilitate removal of suspended solid particles and associated nutrients and contaminants. Uptake of dissolved nutrients and adsorption of oils and greases by the many plant stems present in the pools yields additional benefits.

The conceptual design/structure of the RSC at this site currently involves filling the incised channel with a mixture of sand (80%) and hardwood mulch or chips (20%). A parabolic weir structure will be installed at the upper headcut, at existing grade, to control grade and direct water into the RSC downstream. Continuing downstream, the incised channel will be filled with the sand/mulch media, and stabilized with a series of 3 additional parabolic weir structures, of varying length and slope, depending on the existing topography. Each weir will have a pool immediately upstream for high flow storage and to enhance infiltration of stormwater downward through the sand/mulch media. At the downstream end of the RSC,

material will be excavated down to or below the invert of the channel immediately downstream of the headcut there. A parabolic weir will be installed at the location of the headcut itself, which will control grade at that point in the channel, and will extend upstream as far as needed to stabilize the media in place and accommodate the site topography and channel continuity. The largest pool in the RSC will be just upstream of this last parabolic weir. The RSC design will restore the basic channel invert elevations to their condition before development upstream caused excess runoff and erosion. The design of the RSC will be such that the stormwater flows will be in large part treated by the sand/mulch filter media, and then directed downstream. The structure of the RSC encourages stormwater infiltration below the sand media, which also helps to recreate pre-disturbance conditions and abate stormwater flows.

Monitoring will be undertaken for one year to determine the functionality of RSCs for load reduction of TN, TP, and TSS. An M.S. student will focus on this research, producing a final report which may be used for evaluation of these systems for use in nutrient reduction models such as that for Jordan Lake. Public outreach will include a minimum of two workshops for engineering design professionals in North Carolina. These workshops will teach practitioners how to design, install, and maintain these systems. Also, they will disseminate RSC performance information gleaned during this study. A factsheet will be written detailing RSCs as an introduction to these SCMs for design professionals. It will be housed on the NCSU stormwater group website: www.bae.ncsu.edu/stormwater

21. Monitoring/Environmental Data Collection. Describe in the section below how project data will be used (i.e. demonstrate effectiveness of BMPs installed, calculate load reductions, data to be used for State use support purposes, etc.). If monitoring is needed to document the water quality improvement from a project, a Quality Assurance Project Plan (QAPP) will be required (reviewed and approved by DWQ). For a QAPP template, visit the 319 Program website at <http://portal.ncdenr.org/web/wq/ps/nps/319program/applyfor319>

Stormwater monitoring will be undertaken at the newly constructed Regenerative Stormwater Conveyance (RSC) site in Durham, NC. The goal would be to determine the improvements to hydrology and water quality that these systems provide. These practices have the potential for application across North Carolina, and this study will provide data on load reduction from these devices. The practice will treat an 8.87 acres watershed (a City park), and will improve two head cuts. Monitoring will occur at two locations: (1) the outlet of the untreated watershed, which will serve as the inlet to the RSC and (2) the outlet of the RSC device. These sites will be used in an upstream-downstream design to determine system performance.

Compound weirs (sharp-crested v-notch lower portion and broad crested upper portion) and bubblers will be used to determine flow volumes and peak flow rates at the inlet and outlet of the SCM. ISCO 6712 automated samplers will collect flow-proportional water quality samples (triggered by the bubblers) at these locations. These samples will be preserved (as needed) and delivered to a lab on NC State University campus for analysis. Rainfall will be measured on site continuously during the monitoring period.

The RSC retrofit will be monitored to determine their functionality for removal of nitrogen species (NH_3 , NO_x , organic nitrogen, and TKN) and total nitrogen (TN), phosphorus species (orthophosphate and particle-bound phosphorus) and total phosphorus (TP), total suspended solids (TSS), and heavy metals (Cu, Pb, and Zn). Following the installation of the RSC, monitoring will commence for eighteen storm events (over a roughly twelve month period) for TN, TP, TSS, and heavy metals. Storm events will be spread throughout the seasons to determine if seasonal differences in performance exist. Statistical analysis will be performed to determine the hydrologic and water quality improvement imparted by the RSC device.

22. Public Involvement

A pair of workshops on design, installation, maintenance and performance of RSCs in North Carolina. Data presented in the workshop would include those collected from this project and a pair of RSCs that are being monitored for NCDOT. Additionally, the data from this project and the two DOT RSCs would be presented to engineers and scientists at NCDENR. The NC State University team (Dr. Hunt and Mr. Winston) would provide NCDENR aid in developing a draft RSC chapter for the stormwater BMP manual if results of the RSC evaluations are positive. This may also include evaluation of performance of RSCs as it relates to credit in the Jordan Lake Accounting Tool, Tar-Pamlico & Neuse models, and other design models in use in North Carolina.

A factsheet (part of the Urban Waterways series) would be written for design, construction, and maintenance of these systems. An additional overview of the performance would be presented. This would be kept on the NCSU stormwater team website: www.bae.ncsu.edu/stormwater

23. List Project Outputs and Products (All 319 funded projects are required to submit Quarterly Progress Reports and a detailed Final Project Report, due by the end of the contract for DWQ review and approval.)

- Conceptual and final engineering designs for the implementation of an RSC stormwater BMP in Durham, NC. This design will be completed by Biohabitats, which has the most experience in design of these systems of any company in the US.
- Installation and construction oversight for the RSC.
- Full-scale hydrologic (volume and discharge rate) and water quality (TN, TP, TSS, DO) monitoring to determine RSC impacts on nutrient and sediment concentrations and loads. Data will be used to assess RSC water quality treatment and hydrologic mitigation as a stormwater control measure and impacts on receiving stream health using annual loadings as a basis. These data and loading estimates would be presented to NCDENR for their potential use in the stormwater BMP manual and/or the Jordan Lake Nutrient Accounting Tool.
- City of Durham Third Fork stream data from station just downstream of RSC site.
- A pair of workshops on design, installation, maintenance and performance of RSCs in North Carolina. Data presented in the workshop would include those collected from this project and a pair of RSCs that are being monitored for NCDOT.
- A factsheet (part of the Urban Waterways series) would be written for design, construction, and maintenance of these systems. An additional overview of the performance would be presented. This would be kept on the NCSU stormwater team website: www.bae.ncsu.edu/stormwater
- Quarterly reports.
- Final report.

24. Projects Developing or Implementing a Watershed Restoration Plan must include EPA's 9 Key Elements for Watershed Restoration Plans. Draft Plans must be submitted to DWQ for review and approval at least *60 days before* end of the project/contract period (use additional pages if necessary).

1	An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed
2	A description of the NPS management measures that will need to be implemented to achieve load reductions as well as to achieve other watershed goals identified in the watershed based plan
3	An estimate of the load reductions expected for the management measures
4	An estimate of the amount of technical and financial assistance needed associated costs and or sources and authorities that will be relied upon, to implement the plan
5	An information/education component that will be used to enhance public understanding of the project
6	A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious
7	A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented
8	A set of criteria that can be used to determine whether loading reductions are being achieved overtime and substantial progress is being made towards attaining water quality standards
9	A monitoring component to evaluate the effectiveness of the implementation efforts over time measured against the criteria established under item 8.

Not applicable to this application. A nine element watershed plan for Third Fork Creek has been registered with North Carolina Department of Environment and Natural Resources.

25. References and Literature Cited

NC Department of Environment & Natural Resources. 2005. Cape Fear River Basinwide Water Quality Plan. Division of Water Quality Planning Section, 1617 Mail Service Center, Raleigh, NC 27699-1617, p. 58.

NC Division of Water Quality. 2007. Stormwater Best Management Practices Manual. N.C. Department of Environment and Natural Resources 1601 Mail Service Center, Raleigh, NC 27699-1601.

Rosgen, D.L. 2001. A Practical Method of Computing Streambank Erosion Rate. Proceedings of the Seventh Federal Interagency Sedimentation Conference, Vol. 2, pp. II - 9-15, March 25-29, 2001, Reno, NV.

Project I-8: Briar Creek Stream Restoration

1. Project Title	Briar Creek Stream Restoration - Chantilly
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2a. Grantee Primary Contact or Project Manager¹			
Name	David Goode, P.E., CFM		
Title	Project Manager		
Organization Name	Charlotte Mecklenburg Storm Water Services		
Mailing Address	700 North Tryon Street		
City	Charlotte	State	NC Zip 28202
Telephone	704-432-3087	Fax Number	

¹ A one-page Statement of Qualifications must be provided in Section 3 of the application form to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.

2b. Grantee Execution Address (where contract will be mailed for signature)			
Name	Leslie Johnson		
Title	Interim Assistant County Manager		
Organization Name	Mecklenburg County		
E-mail Address	Leslie.Johnson@MecklenburgCountyNC.gov		
Mailing Address	600 East 4 th Street		
City	Charlotte	State	NC Zip 28202
Telephone	704-432-0090	Fax Number	704-336-5887
Federal Tax ID Number	56-6000319		

2c. Grantee Payment Address (where invoice payments will be mailed)			
Name	David Goode		
Title	Project Manager		
Organization Name	Mecklenburg County		
E-mail Address	David.Goode@MecklenburgCountyNC.gov		
Mailing Address	700 North Tryon Street		
City	Charlotte	State	NC Zip 28202
Telephone	704-432-3087	Fax Number	

3. Required Statement of Qualifications (to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.)

Project Management

The Storm Water Services section of Water & Land Resources manages an annual Capital Improvement Program budget of 5.8 million dollars. Construction projects are managed by the Engineering section which includes four Engineers (all four are licensed NC Professional Engineers) and two field inspectors. Storm Water Services is currently managing twelve active water quality enhancement or restoration projects totaling over 15 million dollars. Additionally, the following projects are complete and were managed by Storm Water Services:

Project	Status	Budget	NC 319 Funding
North Mecklenburg Park Stream Restoration and BMPs	Completed 2013	\$267,347	\$155,740
Torrence Creek Tributary #1	Completed 2013	\$1,428,000	
Torrence Creek at The Park Huntersville	Under Construction	\$919,000	
Little Sugar Creek – Cullman Avenue	Completed 2012	\$381,438	
Little Sugar Creek – 7 th to Elizabeth Avenue	Completed 2011	\$363,000	
Little Sugar Creek – Elizabeth to Charlottetowne	Completed 2011	\$635,000	
Torrence Creek Main Stem and Tributary #2	Completed 2011	\$2,000,000	
Little Sugar Creek – Charlottetowne Ave to Pear Park Way	Completed 2011	\$899,000	
Upper McDowell Creek	Completed 2010	\$742,000	\$421,000
William R. Davie Park Stream Restoration	Completed 2009	\$490,000	
Torrence Creek BMP Project	Completed 2009	\$307,000	
Little Sugar Creek – Pearl Park Way to Morehead Street	Completed 2009	\$18,900,000	
Irwin Creek Stream Restoration	Completed 2006	\$512,854	
McAlpine Creek at Sardis Stream Restoration & Floodplain Enhancement	Completed 2006	\$100,000	
Goose Creek, Promoting LID	Completed 2005	\$258,000	\$154,716
Little Sugar at Liz Hair Stream Enhancement	Completed 2005	\$133,000	

All of the above projects are maintained by Storm Water Services Operation Department. Water

Quality Monitoring

The Water Quality Program of Water & Land Resources manages an annual budget of approximately 3 million dollars. The Program has approximately 30 staff, some of which conduct water quality monitoring such as in-stream storm water monitoring, ambient monitoring, BMP performance monitoring, lake monitoring, macroinvertebrate monitoring, habitat assessment and stream morphology evaluations. Monitoring is completed for numerous reasons such as compliance sampling, pollution identification, program performance measurement, TMDL compliance, watershed management plan conformance, and new technology research. The Program is certified by the Division of Water Quality for laboratory services (field measurements) and biological laboratory services (bioassessment/ taxonomy). The Water Quality Program has been in place since 1969.

319(h) Grant Funds Requested	\$100,141
Match funds or in-kind Match Services	\$645,724
4. Total Project Cost	\$745,865

5. Project Start Date	1/1/2014	Project End Date	12/31/2015 (Construction)
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6. Project Location – REQUIREMENT: Important to submit as completely as possible, especially the Lat/Long coordinates and NC Impaired Waters List Assessment Unit Number.
(NOTE: Payment of 319 Invoices will be held if all required information is not submitted in quarterly reports and the final reports, AU numbers, Lat/Long, and coordinates for all installed BMP practices)

River Basin	Catawba
Watershed(s)	Little Sugar Creek
Watershed size	32,599 acres
Impaired Waters Listed Stream	Yes No X (Project Drains to 11-137-8a and 11-137-8b)
Impaired Waters List Assessment Unit Number	Project is located on Assessment Unit Number 11-137-8-2
HUC(s) (12 digit USGS Hydrologic Unit Codes)	030501030102
County	Mecklenburg
USGS. 7.5 minute topographic quadrangle map(s) in project area	Charlotte East, NC
Position coordinates of project location	Latitude 35.206864° Longitude -80.8047°

7. NPS Pollution Sources to be addressed (Check all that apply)			
	Agriculture		Waste Disposal (includes onsite systems)
	Construction	X	Hydrologic Modification
	Silviculture		Marina and Recreational Boating
X	Urban runoff/Stormwater		Groundwater Loading
	Resource Extraction		Natural Sources
X	Habitat Modification (drainage/filling wetlands, streambank destabilization)		Other:

8. NPS Pollutants to be addressed (check all that apply) KROENING			
	Excess Nitrogen		Pesticides
	Excess Phosphorus		Oil and grease
X	Sedimentation	X	Temperature
	Pathogens/Bacteria		pH
	Metals	X	Alterations
	Low dissolved oxygen		Other:

9. Estimate Load Reduction, if checked for excess nitrogen, excess phosphorus and/or sedimentation²	
# pounds of nitrogen saved from project implementation	Reference:
# pounds of phosphorus saved from project implementation	Reference:
# tons of soil saved from project implementation 134.8 tons/year	Reference: Rosgen, 2006
Load Reduction Model Used: STEPL, Region 5, L-THIA, Other BEHI	

²Providing a load reduction estimate is required for all BMP implementation projects, including demonstrations.

10. Do you intend for collected data to be used by DWQ for Use Support decisions?	
No	Explanation: Project is intended to restore a portion of Briar Creek. Many additional projects and actions will be required to restore the designated use of the Watershed.

11. Do you propose to install BMPs or other ag management measures that would be eligible for NC Agricultural Cost Share Program (ACSP) funding? If Yes, please document that the demand for ACSP funding in your county exceeds the supply, prompting your application for a 319(h) grant.

Yes

No ☒ X

12. Does this proposal address needs that were identified in a DWQ basin plan? If yes, please identify the specific need and the basin in which the need is outlined.

Yes

Explanation: The 2010 Catawba River Basin Plan identifies turbidity exceedances at 21%, Fair Benthos rating and Poor/Fair Fish Community ratings. The proposed project will stabilize stream banks, improve in-stream habitat for benthos and fish and seek to re-vegetate stream side buffers to provide shade and improve soil stability.

13. Project Abstract (short concise summary of the project – DO NOT EXPAND SPACE PROVIDED)

The project is located on the former Doral and Cavalier Apartment site. The sites were home to more than 300 apartment units that repeatedly flooded. Severe flooding occurred at the site in 1995, 1997, 2003, 2008 and 2009. Mecklenburg County and FEMA purchased the Cavalier Apartments for \$9,600,000 and the Doral Apartments for \$4,700,000 and demolished the structures in 2011. In 2012, public meetings on the use of the land were held along with plans to improve the water quality conditions in the area. The proposed project will restore approximately 3300 linear feet of Briar Creek, a tributary of Little Sugar Creek, from Independence Boulevard to Monroe Road in Charlotte, NC. It is estimated that construction of the proposed project, which is already designed, will prevent more than 134 tons of sediment per year from entering Briar Creek. Additionally, the project will improve the habitat in this highly altered channel, restore the vegetated buffer and seek to construct a more natural channel. The proposed project is part of a larger stream restoration effort on the site and adjacent property being funded by the City of Charlotte. Additionally, plans have been prepared for the construction of at least 2 storm water treatment ponds that will treat currently untreated storm water runoff from single family residential, industrial and commercial space located in the area. The proposed stream restoration activities that are the focus of this grant are a critical component of the overall project and essential to its overall success. Restoration of this section of Briar Creek will be the initial phase of construction of the larger project and will provide an important first step in the ecological restoration of the area.

14. Funding Requested								
Budget Categories (itemize all categories)	Section 319			Non-federal match*			Total	Justification (Include detailed explanation for each budget line item)
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3		
Personnel/Salary								
Fringe Benefits								
Contractual	5,007	80,113	15,021	32,286	516,579	96,859	745,865	The County intends to use the grant for construction cost only. The County will contract with a private construction company to do the construction.
Total Direct	5,007	80,113	15,021	32,286	516,579	96,859	745,865	
Indirect (max. 10% of direct costs, per 40 CFR 35.268)								
Annual Totals	5,007	80,113	15,021	32,286	516,579	96,859		
Grand Total	100,141			645,724			745,865	
% of Total Budget	13%			87%			100%	
*Note: Non-Federal match must be a minimum of 40% of the total project budget								

Year 1: January 1 - June 30, 2014 (6 months) – Total MUST equal sum of quarters 1-2 in Milestone Table #18

Year 2: July 1, 2014-June 30, 2015 (12 months) – Total MUST equal sum of quarters 3-6 in Milestone Table #18

Year 3: July 1-December 31, 2015 (6 months) – Total MUST equal sum of quarters 7-8 in Milestone Table #18

15. Budget Summary (Combined federal and match funds)							
	BMP Implementation	Project Management	Education Training or Outreach	Monitoring	Technical Assistance	Other	Total
Personnel							
Fringe Benefits							
Supplies							
Equipment							
Travel							
Contractual	745,865						745,865
Operating Costs							
Other							
Total	745,865						745,865

16. Local and State Match (non-federal) Summary	
Total Match amount	\$645,724
Cash Match	\$645,724
In-kind Match	\$
Source(s) of Cash Match	Charlotte-Mecklenburg Storm Water Services will be using funds from the storm water utility fee. The County intends to use the 319 grant funding for the construction phase of the project. The County has 70% design plans for the proposed improvements prepared by an engineering consulting firm.
Source(s) of In-kind Match	

17. Project Partners (may add more, if needed)³			
Agency Name	City of Charlotte Storm Water Services		
Agency Address	600 East 4 th Street, Charlotte, NC 28202		
Role/contribution to Project	BMPs and minor system stream		
Contact Person	John Schrum	Phone No.	704-336-3927
E-mail address	jschrum@ci.charlotte.nc.us		
Agency Name	North Carolina Department of Public Safety		
Agency Address	4201 Mail Service Center		
Role/contribution to Project	Grant Administrator for property acquisition		
Contact Person	Chris Crew	Phone No.	919-825-2305
E-mail address			
Agency Name	Mecklenburg County Park and Recreation		
Agency Address			
Role/contribution to Project	Recreation component		
Contact Person	Gwen Cook	Phone No.	704-432-1570
E-mail address	Gwen.cook@MecklenburgCountyNC.gov		
Agency Name	Charlotte Mecklenburg Schools		
Agency Address	701 Briar Creek Road, Charlotte, NC 28205		
Role/contribution to Project	Environmental Education for Chantilly Elementary School		
Contact Person	Dr. Sophia Hazelhurst	Phone No.	980-343-0692
E-mail address			

³ A one-page Statement of Qualifications must be included in Section 3 of the application to confirm that anyone designing, installing, or monitoring the proposed project is qualified to do so. Include in the statement any past and/or ongoing 319 grant funded projects.

18. Project Milestone Schedule		
Time Period/Date	Activities (List specific quantifiable outputs or activities that will be achieved during each quarter)	Anticipated % of Requested Funding Spent¹
First Quarter Jan-Mar 2014	We will be completing the design phase and the permitting phase of the project.	0%
Second Quarter Apr-June 2014	We will have the construction bid phase of the project and may begin construction.	5%
Third Quarter July-Sept 2014	Construction phase of the project will be in progress and anticipated 25% of the project complete by end of quarter.	25%
Fourth Quarter Oct-Dec 2014	Construction phase of the project will be in progress and anticipated 45% of the project complete by end of quarter.	45%
Fifth Quarter Jan-Mar 2015	Construction phase of the project will be in progress and anticipated 65% of the project complete by end of quarter.	65%
Sixth Quarter Apr-Jun 2015	Construction phase of the project will be in progress and anticipated 85% of the project complete by end of quarter.	85%
Seventh Quarter July-Sept 2015	End of construction phase of the project with creation of the punch list.	90%
Eighth Quarter Oct-Dec 2015	Finish the punch list work on project.	100%

¹ Please show anticipated dollar amount, percent of grant spent that quarter, and cumulative percent of grant spent for project. Quarterly invoices will only be reimbursed up to percent indicated. Unused funds will carry forward to next quarter.

² 10% of grant will be held until receipt of Final Project Report

Note:

Sum of funds spent in quarters 1-2 MUST equal year 1 total in Budget Table #14

Sum of funds spent in quarters 3-6 MUST equal year 2 total in Budget Table #14

Sum of funds spent in quarters 7-8 MUST equal year 3 total in Budget Table #14

19. Background and goals of the project. Expand space, if necessary.

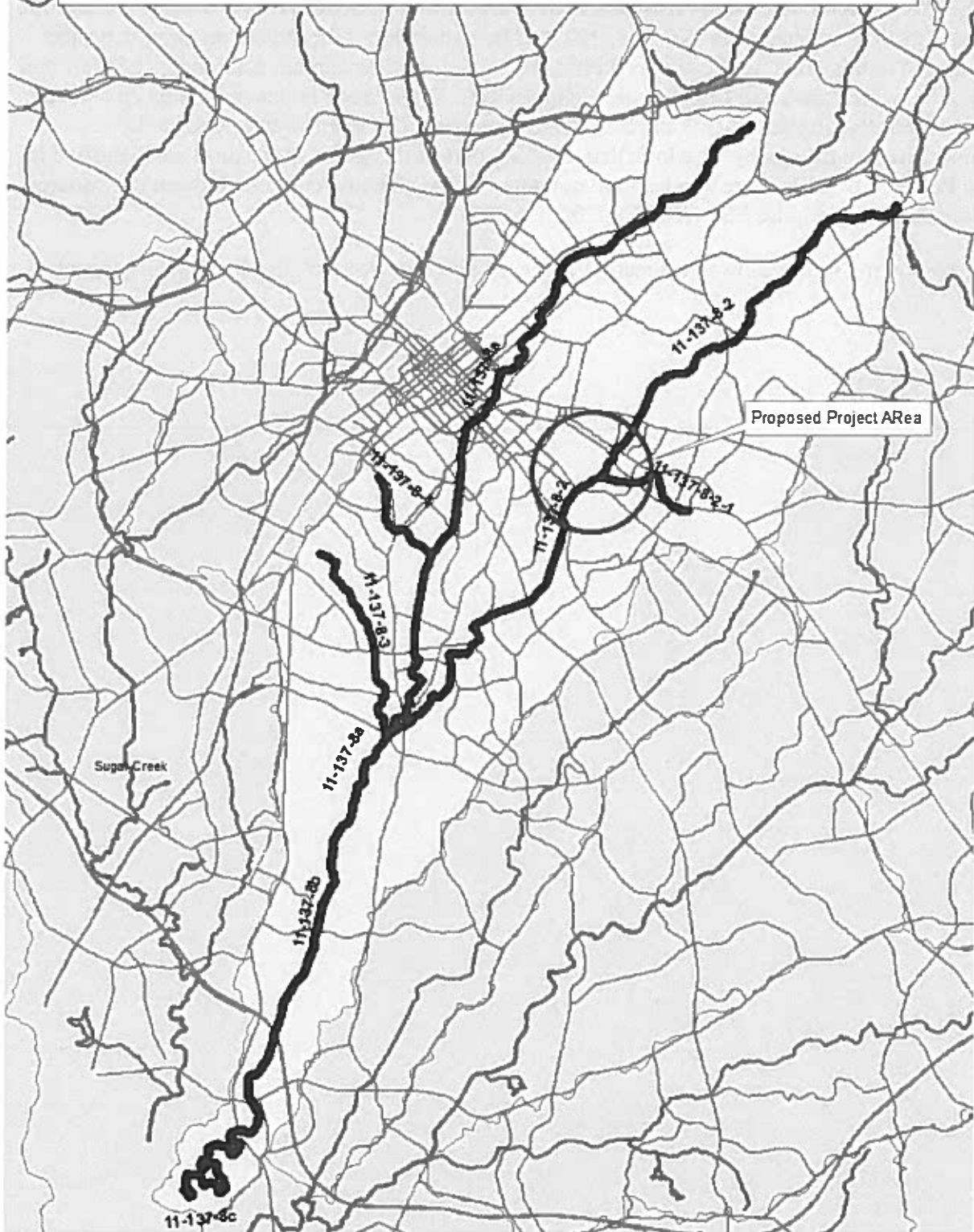
As mentioned in section 13 of this grant application the project area was previously home to more than 300 apartment units that had repeatedly flooded since 1995. The apartments had been built in Charlotte's worst flood hazard area before floodplain restrictions had been implemented. In 2008 Mecklenburg County purchased the Cavalier Apartments and removed the structures. In 2010 Mecklenburg County with FEMA assistance purchased the Doral Apartments and subsequently demolished the structures. The site, totaling 21.4 acres, presented many opportunities for water quality improvement, environmental education (an elementary school is directly adjacent to the site) as well as passive recreation. TMDLs have been prepared for turbidity and fecal coliform bacteria for sections of Little Sugar Creek downstream of the project area (NCDENR, 2002 and NCDENR, 2005). However, no Waste Load Allocation for storm water is included in either TMDL, therefore no Water Quality Recovery Program has been developed for either TMDL. Additionally, several downstream sections are 303(d) listed for copper, fish community and benthic community impairments. The site was evaluated for its environmental restoration potential and 3 broad improvements were identified. The following table identifies the improvements, sponsoring agency and impairments to be addressed.

Component	Sponsoring Agency	Impairment(s) to be addressed
Stream Enhancement of Edwards Branch and Briar Creek*	Mecklenburg County	Turbidity and macroinvertebrate health
Construction of 2 Wet Ponds	City of Charlotte	Metals, bacteria, turbidity
Enhancement of small tributary draining Chantilly neighborhood	City of Charlotte	Turbidity and macroinvertebrate health

*Component that is proposed as part of this grant application.

The proposed project will provide local improvements to in-stream habitat, stream buffers and channel stability. It will also prevent 135 tons of sediment per year from eroding and being transported downstream, which will improve downstream turbidity conditions. The actively eroding channel, which is the source of the 135 tons of sediment per year, will be restored. After restoration, the channel is expected to be in equilibrium with respect to sediment, that is the amount of sediment entering the restored section will equal that leaving the restored section. Stated another way, the restored channel will not be a net source of sediment. Additionally, storm water wet ponds that are not part of this grant application will be constructed on the site in coming years that will treat urban storm water runoff for fecal coliform, sediment and nutrients as well as provide storm water volume storage, which will reduce erosive forces on the downstream channel. These BMPs are being funded by the City of Charlotte, which is a separate financial entity, and the costs are not shown as matching funds within this grant application. The two BMPs that are expected to be funded by Charlotte are estimated to treat 132.8 acres of highly impervious urban land-uses. Together the BMPs are expected to remove 61.9 tons of sediment per year. Moreover, the additional stream restoration being constructed on the site that is not a part of this grant will remove another 87 tons of sediment per year. This brings the total for the entire project to 283.9 tons per year. Additional project expenditures that are not part of this grant are estimated to be \$1,226,000. The following map shows the location of the proposed project within the Briar/Little Sugar Creek Watershed along with the Assessment Unit Numbers utilized in the 303(d) list:

Assessment Units in the Briar/Little Sugar Creek Watershed



A portion of the stream restoration project proposed in this grant application is included in the Edwards Branch Focus Area (also identified as a portion of LS0507) of the NCEEP's Charlotte Area Local Watershed Plan (NCEEP, 2003). The remainder of the stream restoration project proposed in this grant application is within the immediate downstream catchments LS0601 and LS0605, which are a part of the larger Central/Upper Briar Creek Focus Area (Figure 43 in the Catchment Results document) and Sub- watershed 004. The storm water ponds to be constructed on the site by Charlotte that are not a part of this grant application are identified in the Plan as LS013B. Page numbers are not noted in the Plan however the relevant information can be found on Figure ES9 (NCEEP, 2003).

The following figure shows the location of the proposed project within Mecklenburg County:

Proposed Project Location in Mecklenburg County, NC



The following figure shows the project area along with elements of the overall project not included in this grant application:

Briar Creek Stream Restoration - Chantilly



20. A detailed description of the project. Expand space, if necessary.

The County intends to use 319 grant funds to construct approximately 3,600 feet of stream enhancement and restoration along Briar Creek and Edwards Branch. The Briar Creek portion of the project is approximately 2,400 feet of stream enhancement and restoration from Monroe Road to Independence Boulevard. Exhibit A attached to this application is the overview sheet from the 70% design plans for this project. The improvements will include meandering the stream and creating stream diversity through the construction of pools and riffles to lift the habitat for aquatic life. The plans include changing the cross section dimension of the stream to reduce the stress on the banks and reconnect the floodplain to the channel. The work includes the eradication of invasive non-native plants along the existing stream and planting native riparian plants to create long term stability and habitat (approximately 15 acres of planting). The estimated construction cost of this section of stream enhancement and restoration is \$509,338. Exhibit B attached to this application is a detailed cost estimate generated from the 70% design plans. The County has an engineering consulting firm currently working on the construction drawings and they are 70% complete. The County does not intend to use 319 grant funds for the design phase of the project. The County intends to use the 319 grant funding for construction phase of the proposed improvements. The County will contract with a private construction firm to do the construction and does not intend to use county forces.

In addition, the County plans to design and implement restoration/enhancement along Edwards Branch from the confluence with Briar Creek to Briar Creek Road. . Exhibit A attached to this application is the overview sheet from the 70% design plans for this project. The Edwards Branch reach is approximately 1,200 feet of channel, bank and floodplain improvements. Similarly the Edwards Branch improvements include meandering the stream and creating stream diversity through the construction of pools and riffles to lift the habitat for aquatic life. The plans include changing the cross section dimension of the stream to reduce the stress on the banks and reconnect the floodplain to the channel. The estimated construction cost of this section of stream enhancement and restoration is \$236,527. Exhibit B attached to this application is a detailed cost estimate generated from the 70% design plans.

See the project overview sheet attached to the end of this application showing the extents of the proposed stream work on Briar Creek and Edwards Branch. The project is currently at the 70% design phase and Mecklenburg County is requesting the 319 grant funds for the construction phase of the project only not engineering design.

21. Monitoring/Environmental Data Collection. Describe in the section below how project data will be used (i.e. demonstrate effectiveness of BMPs installed, calculate load reductions, data to be used for State use support purposes, etc.). If monitoring is needed to document the water quality improvement from a project, a Quality Assurance Project Plan (QAPP) will be required (reviewed and approved by DWQ). For a QAPP template, visit the 319 Program website at <http://portal.ncdenr.org/web/wq/ps/nps/319program/applyfor319>

The effectiveness of the proposed stream restoration project will be determined through annual post- construction assessment of BEHI/NBS (Rosgen Stream Assessment) throughout the proposed stream restoration project. The sediment loading values determined will be summed with the upland loading values to determine compliance with the overall in-stream sediment loading goal. A total of 5 stream monitoring sites will be established and water chemistry, macroinvertebrates and fish will be sampled. Two sites just upstream of the project, one within the project boundaries and one downstream site will be monitored. Additionally, in-stream habitat will be assessed using the MHAP (Mecklenburg Habitat Assessment Protocol). MHAP assessment includes riparian buffer assessment and an assessment of the vegetation planted as a part of the stream restoration project. Additionally, photographs will be collected annually at the 5 monitoring sites. Water chemistry, macroinvertebrates and fish monitoring and MHAP and BEHI/NBS observations will occur once prior to construction and once during Year 2, Year 4 and Year 5 after construction is complete with photographs being collected before construction and once each year during Year 1 through Year 5. All monitoring will be conducted in compliance with the Approved Quality Assurance Project Plan (QAPP), which was approved in 2009 (Charlotte Mecklenburg Storm Water Services, 2009).

22. Public Involvement

The County and City have conducted three public meetings in conjunction with the Mecklenburg County Park and Recreation Department as well as the Charlotte-Mecklenburg School System to gather information from the public regarding their input on the proposed improvements. The first public meeting was held on October 14, 2008 to present the proposed improvements for Briar Creek, Edwards Branch, Chantilly Park Tributary and one water quality pond on the former Cavalier Apartments site. At that time, FEMA has approved a grant to purchase only the Cavalier Apartments. Subsequent to the meeting, FEMA approved a grant to purchase half of the Doral Apartment complex across Briar Creek from Cavalier. These apartments were the most frequently flooding properties in Charlotte. The project was put on hold at this point to allow for the purchase and demolition of the Doral Apartments which would allow for the expansion of the overall water quality project. On April 25, 2012 another public meeting was held to discuss all of the proposed improvements including the Briar Creek, Edwards Branch, Chantilly Park Tributary, the water quality pond on the Cavalier site and the added water quality pond on the former Doral property. Only a conceptual plan was presented for the overall project and there was substantial discussion regarding the water quality ponds. The County and City agree to create more fully developed plans for the ponds and present the plans to the public for input. On May 13, 2013 the City and County provided 30% design plans for the entire project including the water quality ponds for comment and input.

23. List Project Outputs and Products (All 319 funded projects are required to submit Quarterly Progress Reports and a detailed Final Project Report, due by the end of the contract for DWQ review and approval.)

Mecklenburg County Storm Water Services (County) plans to design and implement a stream enhancement and water quality improvement along Briar Creek from Independence Boulevard to Monroe Road. The Briar Creek reach is approximately 2,400 linear feet (LF) in length and will include channel, bank and floodplain improvements, and the use of native riparian plants to stabilize the stream banks and create habitat.

In addition to the Briar Creek improvements, the County plans similar stream restoration for approximately 1,200 LF along Edwards Branch. The City plans to construct two water quality ponds to treat approximately 125 acres of highly impervious urban runoff. All of these proposed improvements together shall improve the water quality of Briar Creek by reducing the load of sediment, total nitrogen and total phosphorous in Briar Creek.

24. Projects Developing or Implementing a Watershed Restoration Plan must include EPA's 9 Key Elements for Watershed Restoration Plans. Draft Plans must be submitted to DWQ for review and approval at least *60 days before* end of the project/contract period (use additional pages if necessary).

1	An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed
2	A description of the NPS management measures that will need to be implemented to achieve load reductions as well as to achieve other watershed goals identified in the watershed based plan
3	An estimate of the load reductions expected for the management measures
4	An estimate of the amount of technical and financial assistance needed associated costs and or sources and authorities that will be relied upon, to implement the plan
5	An information/education component that will be used to enhance public understanding of the project
6	A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious
7	A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented
8	A set of criteria that can be used to determine whether loading reductions are being achieved overtime and substantial progress is being made towards attaining water quality standards
9	A monitoring component to evaluate the effectiveness of the implementation efforts over time measured against the criteria established under item 8.

This project is implementing the NCEEP Charlotte Local Watershed Plan (NCEEP, 2003). The proposed project will address sources of turbidity and poor macroinvertebrate which downstream sections of Little Sugar Creek are impaired for. A copy of the Charlotte Local Watershed Plan (LWP) prepared by the NC Ecosystem Enhancement Program can be found here: <http://portal.ncdenr.org/web/eeep/rbrps/catawba>

1. An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed

The LWP identifies sediment related issues related to wet weather (storm water) flow as a primary source of impairment in the watershed. In addition to sediment, it cites total phosphorus and metals being elevated when elevated flow is present. Additionally, the LWP identifies poor biological conditions in spite of reasonably good or fair habitat conditions present at the monitoring sites. This observation would tend to indicate that non-point source runoff may contain constituents impacting the biological populations directly. Additionally, the TMDLs for fecal coliform and turbidity indicate wet weather conditions greatly contribute to turbidity and fecal coliform impairment. The LWP also identifies impervious cover as having the most significant effect on watershed health. A target sediment loading rate of 600 pounds/acre/year was identified in the LWP (Page 13 of the LWP) along with a TP target of between 0.3 and 0.5 pounds/acre/year.

The proposed project will stabilize the channel within the project area removing it as a source of sediment in the Little Sugar Creek Watershed. Furthermore, other components of the project not

included in this grant application will address fecal coliform, metals and storm water flow generated from nearby impervious surfaces. The demolition of the apartments has directly removed impervious surfaces from the floodplain of Briar Creek, which will eliminate the source into perpetuity.

2. **A description of the NPS management measures** that will need to be implemented to achieve load reductions as well as to achieve other watershed goals identified in the watershed based plan

The LWP identifies several NPS management measures to be implemented in the watershed:

1. New Development Control. The project and tributary area are under the zoning control of The City of Charlotte. Charlotte has implemented post construction controls that are at least as restrictive as the state recommended standards. The LWP recommends controls requiring 85 percent TSS removal, which is currently the standard in the City of Charlotte.
2. Sediment and Erosion Control. The project and tributary area are under the zoning control of The City of Charlotte. Charlotte has a proactive erosion control program that seeks to prevent off-site sedimentation from land disturbing activities.
3. Increased storm water volume and peak flow rate. The project and tributary area are under the zoning control of The City of Charlotte. Charlotte has implemented post construction controls to provide detention standards for storm water volume and peak flow rate to prevent both flooding and downstream channel impacts.
4. Implement Structural BMPs on currently untreated areas (BMP retrofits). The LWP recommends retrofitting structural BMPs on existing land-uses to remove target pollutants.
5. Implement stream restoration, enhancement and preservation where appropriate. The LWP recommends changing the geomorphology of the stream channel to provide a stable conduit for storm flow and to improve in-stream habitat for aquatic organisms.

The following table is taken from the LWP and identifies watershed stressors and management strategies:

Stressors and Issues	Management Strategies
Stream Bank Erosion	BMPs, stormwater ordinance, stream restoration, riparian buffer, LID
Channel Modification	Stream restoration
Excess Sediment Inputs	Implementation of Phase II stormwater requirements, stream and wetland restoration, S&EC practices
Excess Nutrient Inputs	Stream and wetland restoration, BMPs, point-source reductions, implementation of Phase II stormwater requirements, continued monitoring
Excess Heavy Metals	Stream and wetland restoration, BMPs, point-source reductions, implementation of Phase II stormwater requirements, continued monitoring
Stormwater	Implementation of Phase II stormwater requirements, BMPs
Impervious Cover	Stormwater BMPs, stormwater ordinance, LID

3. An estimate of the load reductions expected for the management measures.

An estimated 135 tons/acre/year of sediment is anticipated to be removed from the Little Sugar Creek Watershed as a result of the project proposed in this grant application. Additional pollutant load reductions are expected from the construction of the two BMPs and additional stream restoration to also be constructed as a part of the overall restoration of the project site. The overall sediment reduction estimate for all project components is 283.9 tons/year.

4. An estimate of the amount of technical and financial assistance needed associated costs and or sources and authorities that will be relied upon, to implement the plan

Specific costs to implement the LWP to obtain compliance with applicable water quality standards were not provided. However, the participation of several entities that will be crucial to the overall success of restoring the Little Sugar Creek Watershed were identified in the LWP. They are as follows:

- North Carolina Ecosystem Enhancement Program
- Charlotte – Mecklenburg Storm Water Services
- Charlotte – Mecklenburg Utilities
- Private Mitigation Banks
- North Carolina Clean Water Management Trust Fund
- North Carolina 319 Grant Fund

5. An information/education component that will be used to enhance public understanding of the project

Section 22 of this grant application presents the Public Involvement component of the project. Additionally, the site will be used to highlight stream restoration and retrofit structural BMP techniques in a passive recreation setting with an environmental education focus. The project site is directly adjacent to Chantilly Elementary School, an active stakeholder in the project, will use the site as a component in their STEM curriculum. Educational signage will be installed to

explain the techniques and periodic tours will be conducted for interested citizens and professionals. Past experience in the McDowell Creek Watershed has emphasized the importance of citizen involvement in watershed restoration efforts. Typically, educated and involved citizens are advocates for additional restoration efforts and have initiated additional projects on private property.

6. A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious

The LWP does not explicitly identify a schedule for implementation of the management measures identified. However, the Water Quality Recovery Programs (WQRP) developed for the Fecal Coliform and Turbidity TMDLs have specific deadlines that must be met to maintain compliance with Charlotte's Phase I NPDES permit.

7. A description of interim, **measurable milestones for determining whether NPS management measures** or other control actions are being implemented

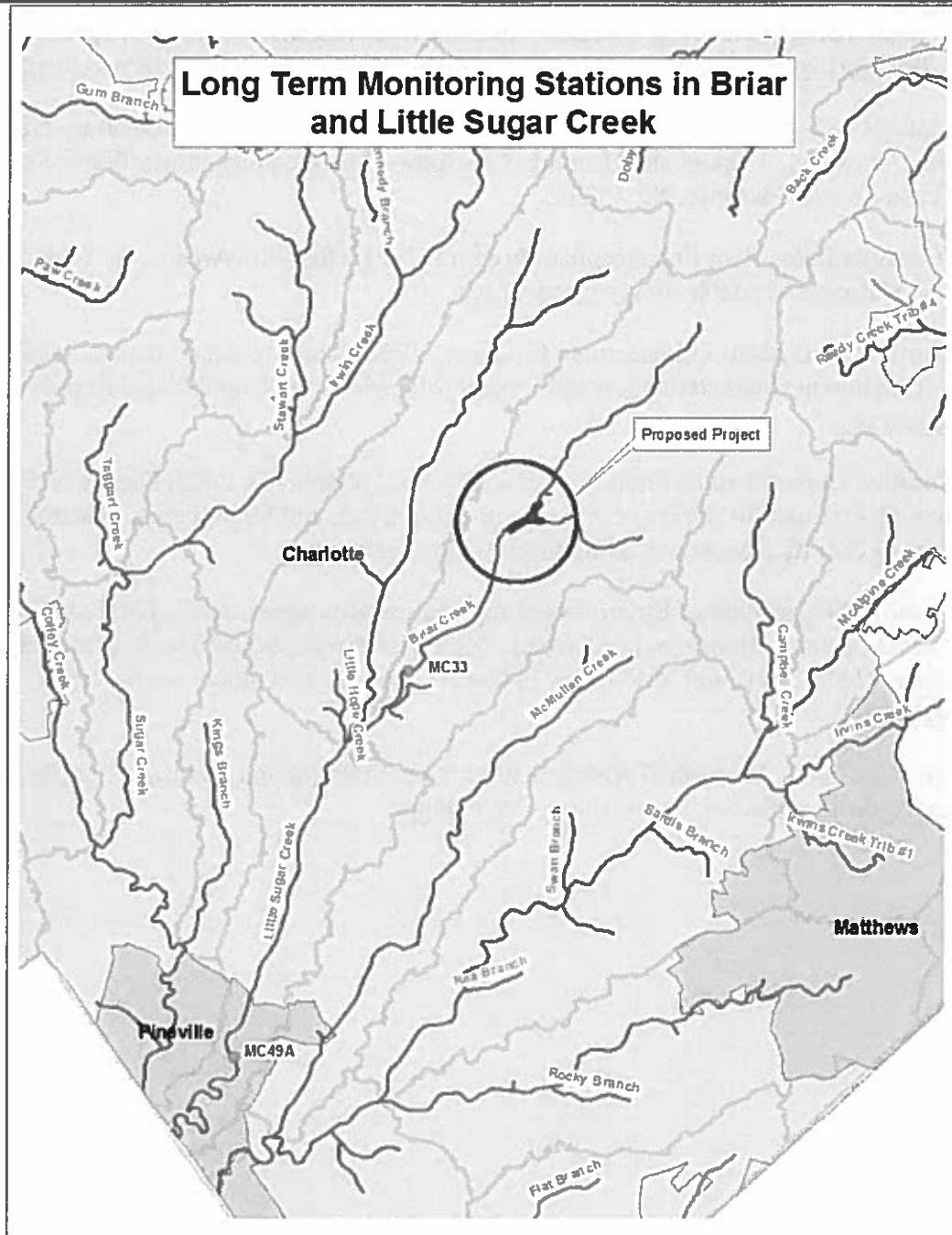
The LWP identifies evaluation of the management measures at the catchment scale to measure progress at attaining watershed scale goals. Attempting to assess the impact of a single project on a watershed the size of Little Sugar Creek is statistically impossible. Rather, evaluation of pre and post project conditions and quantification of those conditions is a realistic, implementable approach.

8. A set of criteria that can be used to determine whether loading reductions are being achieved overtime and substantial progress is being made towards attaining water quality standards

The LWP identifies loading criteria for both sediment and total phosphorus. Similarly, the Fecal Coliform and Turbidity TMDLs identify load reductions to attain compliance with water quality standards. Evaluation of long term monitoring data collected at Charlotte Mecklenburg Storm Water Services monitoring sites MC31 and its replacement MC33 provides the ability to evaluate progress toward attaining load reduction targets within the entire Briar Creek Watershed. Additional monitoring sites downstream allow evaluation of data within the Little Sugar Creek Watershed. All long term monitoring sites within the Briar and Little Sugar Creek Watersheds are located at USGS stream flow stations, allowing the conversion of water quality measurements and flow into loading calculations that can be normalized over watershed area to arrive at load per unit area values (pounds/acre/year).

9. A **monitoring component** to evaluate the effectiveness of the implementation efforts over time measured against the criteria established under item 8.

Long term water quality monitoring in the Briar and Little Sugar Creek Watersheds is conducted by Charlotte Mecklenburg Storm Water Services at MC33 and MC49A. See the following map for the general location of these sites within the watershed. Water quality samples are collected monthly at both sites, macroinvertebrate samples are collected annually, fish samples are collected once every 5 years and physical measurements (including turbidity) are collected hourly Both sites are also the location of USGS stream flow monitoring stations. The sites are continuously evaluated for water quality problems and potential improvements. Annual reports are prepared describing long term trends as well as annual observations and comparisons of collected data with water quality standards as well as watershed loading goals. All monitoring conducted by Charlotte Mecklenburg Storm Water Services complies with its approved QAPP (Charlotte Mecklenburg Storm Water Services, 2009). These sites represent long term monitoring on the watershed scale. Monitoring specific to the project to measure its effectiveness is proposed in this grant application and is outlined and described in Section 21.



25. References and Literature Cited

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